

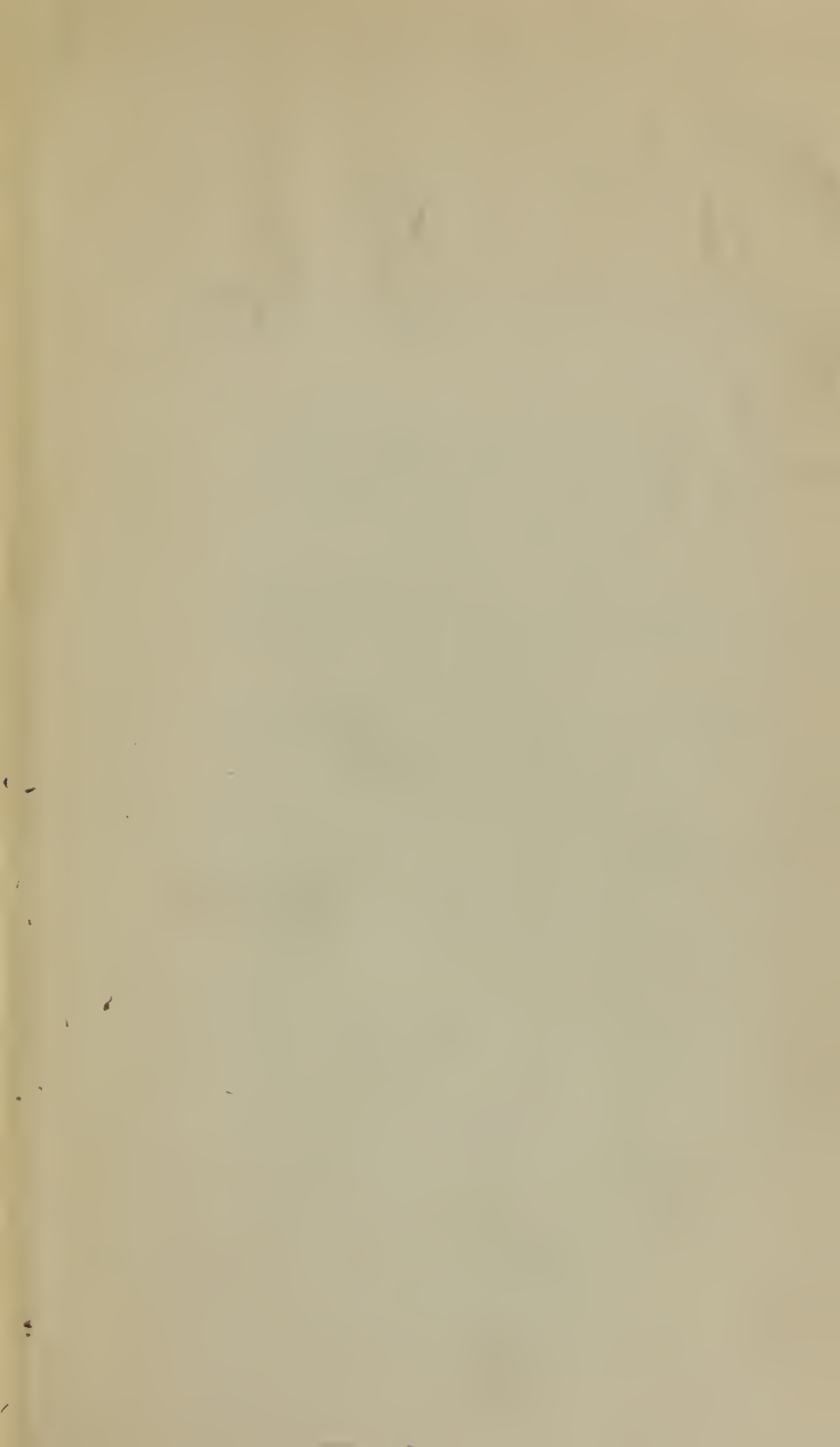
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PRIZE ESSAY OF THE ROYAL ACADEMY.

A

PRACTICAL TREATISE

ON

LARYNGEAL PHTHISIS, CHRONIC LARYNGITIS,

AND

DISEASES OF THE VOICE.

By ^{revised} A. TROUSSEAU AND H. BELLOC, M. D.

PATHOLOGY AND SURGERY;

OR, AN

EXPOSITION OF THE NATURE AND TREATMENT

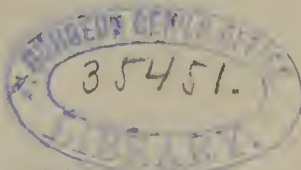
OF

LOCAL DISEASE.

By JOHN DAVIES,

SURGEON TO THE GENERAL INFIRMARY AT HERTFORD, ETC.

BOTH WORKS COMPLETE IN ONE VOLUME.



PHILADELPHIA:

CAREY & HART.

1841.

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LARYNGEAL PHTHISIS,
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DISEASES OF THE VOICE.

By A. TROUSSEAU,

PROFESSOR OF THE FACULTY OF MEDICINE OF PARIS, HOSPITAL PHYSICIAN, MEMBER OF THE
LEGION OF HONOUR, &c., &c.

AND

H. BELLOC, M. D.

TRANSLATED

By J. A. WARDER, M. D.,

OF CINCINNATI.

3545-1
PHILADELPHIA:

CAREY & HART.

.....
1841.

TRANSLATOR'S PREFACE.

IN presenting this translation, the chief motive has been to furnish the profession with a treatise respecting a very important class of diseases, which demand the serious attention of American practitioners.

The present volume, though not free from defects, is very comprehensive, and affords a valuable fund of useful information, instead of the isolated facts and remarks which have hitherto been scattered through our libraries; and besides, the work embraces some new ideas and modes of treatment, which must prove valuable to the profession, who will have cause to feel grateful to Messrs. Trousseau and Belloc for their exertions, and the results of their experience.

The translator has been unwilling to clog the pages of this work by the introduction of any extraneous or original matter, in the way of discussion upon mooted points, or strictures upon any passages that were not precisely accordant with his own views; but he must be allowed here to add his testimony in favour of the author's plan of topical treatment, which has fully answered his most sanguine expectations, and he has merely inserted through the body of the work a few explanatory notes, with formulæ, that may not be familiar to the American reader.

These pages are submitted to the generosity of the public, who are requested to overlook any gallicisms and deficiencies that may have crept in, while they must acknowledge the merits of this work, which has been every where admired and well received.

Cincinnati, September 2, 1839.

TO
PETER BRETONNEAU.

A. TROUSSEAU.

TO
M. PARADIS,
OF AUXERRE,
IN TESTIMONY OF ESTEEM AND FRIENDSHIP.

H. BELLOC.

THE AUTHOR'S PREFACE.

HAVING commenced a work upon Diseases of the Larynx, when the Academy proposed their prize, our only task has been to arrange our materials to suit their programme.

In crowning our memoir, the Academy have imposed upon us the obligation of rendering ourselves more deserving of their vote. Therefore, this work, though like the memoir in form and arrangement, differs from it in extent, and in the choice and number of cases.

As this is the first that has been published *ex professo*, the reader must expect to find numerous imperfections.

In the absence of other claims upon the notice of practitioners, we have, at least, that of being the first to prescribe and employ topical medications in chronic diseases of the larynx. This we believe to be an important step gained in the therapeutics of laryngeal phthisis, chronic laryngitis, and diseases of the voice.

Heretofore, the mucous membrane of the larynx, like that of the bronchia, had been addressed by indirect means; excepting some attempts at the use of gaseous applications to the air passages. We have ascertained that this membrane is accessible to topical applications, and should be treated like conjunctivitis, diseases of the pharynx, or of the skin itself.

Our success proves, that if it be not *the best*, this plan is, at least, better than those heretofore employed.

To have provided a curative plan, is to deserve well of science; and we are happy to think that some patients owe us their lives and health.

Paris, May 15th, 1837.

A

TREATISE

ON

LARYNGEAL PHTHISIS.

CHAPTER I.

DEFINITION AND HISTORY.

THE word *phthisis* signifies consumption. Every chronic disease, attended with hectic fever and emaciation, has heretofore borne the name of *phthisis*.

Thus, a chronic lesion of the kidney, with suppuration, hectic fever, and marasmus, would be a *phthisis*, although there were no tubercle, just as a similar affection of the lungs would be so styled. The same may be said of any other lesion, such as a suppurative white swelling, Pott's disease, ulcerating cancers, &c. &c.

To the generic term *phthisis*, which embraces the assemblage of phenomena, common to all the organic lesions, producing hectic and marasmus, custom requires that we should add the specific name by which we refer the origin of a whole train of symptoms to a local lesion. Thus, the terms pulmonary, dorsal, renal, mesenteric, determine the species of a common genus.

As consumption is oftener produced by pulmonary tubercles than by any other cause, we use the word *phthisis* to denote their presence, even before marasmus has appeared;—in this case, consumption is only the last degree of *phthisis*.

This perversion is vexatious, and often produces confusion in medical language. We have but one word to express very different ideas, and this word signifies, in turns, the presence of tubercles in the lung; the state of the patient having tubercles; and even, according to some authors, an especial predisposition to their production.

The diction of the Academy proves, that they have not partaken

of the common error, and that they intend to preserve the name of *phthisis* for other diseases than those of the lungs.

The specific epithet that has been added to the generic term *phthisis*, proves an implied distinction; thus, when we speak of *pulmonary phthisis*, we indicate that the lungs were the exclusive seat of the symptoms, and that they remain the focus of the disease.

Thus, the Academy, in employing the words *laryngeal phthisis*, wished to speak of a chronic disease of the larynx, if not exclusively, at least prominently interested in causing the hectic fever and consumption.

In the rigorous and literal acceptation of the word, we must understand by *laryngeal phthisis*, a *chronic affection of the larynx, able of itself to produce consumption*.

But from proofs that will be developed in this work, the disease of the larynx alone may induce consumption and death, though this is a rare termination; because the anatomical arrangement of the parts is such that the patients die suffocated, before they reach the last stage, or consumption.

But, if a tubercular patient, suffering under hectic fever, should be attacked with a chronic pleurisy, that would cause death more rapidly than the tubercular affection which induced it: he must, nevertheless, be considered as dying from pulmonary phthisis.

For the same reason, if a man, affected with a chronic disease of the larynx, should die from the increased thickening of the mucous membrane, his death would still be attributable to *laryngeal phthisis*.

These reflections show us the necessity of a more extended definition. We adopt the following:—*Any chronic alteration of the larynx which may bring on consumption, or death in any way*.

This definition will appear a sufficient proof, that in applying the title to our work, we have yielded to custom, and should have written upon *chronic diseases of the larynx*, and shown the very rare circumstances under which these affections lead to consumption.

We hope that the medical public will excuse our application of an old term to new researches, by which we have attempted to clear up so obscure a question.

HISTORY.—The ancients have left us little worthy of record; even modern writers appear destitute of one precise idea respecting these alterations.

It is true, we find some accounts of diseases that may have belonged to ulcers of the larynx and trachea; but they are so meagre, as to convey very imperfect notions of the origin, progress, terminations, and treatment of laryngeal phthisis.

Hippocrates does not refer to the affection. What Galen says, only shows how imperfectly he was acquainted with the lesion.¹

He considered it very easily cured, and reports two cases, without mentioning a single symptom that we now attribute to the organic alteration of the larynx and trachea.

From this reproach of ancient and modern authors, we except the admirable thesis by M. Cayol.¹ No one could better appreciate the value of prior citations, selected without judgment or taste, evincing more patience than enlightened sense and solid reasoning in their authors.

Aetius, so often cited by the moderns, has copied almost exactly from Galen. He adds; *non paucos hoc modo affectos curavimus.*

In all we can glean from the older writers, we find only here and there a few obscure observations on the various alterations of the air passages; but nothing approaching a history of the affection.

Morgagni was the first to give a detailed account of the disease, and he appears never to have witnessed ulceration in the upper part of the air passages: so that what he says does not constitute a history of laryngeal phthisis, but has only served as data for later essays. Indeed, the case he reports in letter 15, art. 13, which we shall publish as No. 32, gives no detail of the symptoms experienced. He merely says: she was asthmatic for a long time, that her voice was feeble, and that her physicians considered her phthisical. (*Jam diu asthmatica, imminutâ insuper voce, à medicis procul dubio ex pulmonibus laborare credebatur.*

The symptomatology of the case reported in the same letter, article 15, is more complete. We are told how the patient breathed, what was the character of the sputa, the aspect of the throat, and the point to which the pain was referred; but, in the reflections that follow, Morgagni has not established the existence of laryngeal phthisis as a special affection, capable of causing death in any other manner than by suffocation.

In his 22d letter, (article 27,) he gives the detailed history of a tracheal phthisis, which he cured, though all the physicians had considered the patient attacked with pulmonary phthisis. He concludes, that many of the reported cures of phthisis might have been merely tracheal.

It is surprising, that the reflections he made upon the latter affection did not lead him to apply them also to ulcers of the larynx, of which he had before spoken, and thence to conclude the possibility of consumption being a consequence of ulcerative action in the upper parts of the air passages.

Borsieri,² seizing the observation of Morgagni, we have just cited, stated positively that the larynx and trachea might become the seat of ulcerations capable of producing hectic and death. He is then the first who spoke of laryngeal phthisis in the true sense of the term. In paragraphs fifty-seven and sixty-two, of his fourth

¹ Recherches sur la phthisie trachéale. Paris, 1810, in 4to.

² Institutiones Medicinæ Practicæ. Berolini, 1826, tom. vi. § 57 & 62.

volume of the Institutes of Practical Medicine, he portrays the disease; see cap. 3, § 55, 57.

*Sunt etiam qui existiment ulcera laryngis atque asperæ arteriæ, quia pulmonibus non insident, à phthisi secludenda esse. Verùm ab his quoque corpus sæpè deperit, et lenta febricula cietur, quâ omnis altrix materies absumitur: plerùmque enim pulmo unâ afficitur, vel brevi eadem labes ad eum propagatur. Quapropter hanc phthisin, nisi pulmonariam, trachealem certè appellandam esse, non ineptè judicaverim.*¹

While we wish to do Borsieri justice, we cannot agree with Joseph Franck, who said he could not avoid smiling, when he read in the Dictionary of Medical Sciences, that Cayol had been the first to give a good monograph upon the subject. Indeed, the work of Cayol is so far superior to the few words of Borsieri, that it deserves a share of the credit given by Franck to Borsieri alone; who seems to have written under the influence of a preconceived theory, rather than from practical observations.

What physician, who had seen laryngeal phthisis, would venture to assert, with the author of the Institutes of Practical Medicine, that there was no oppression, no difficulty of breathing, *even on going up stairs*, that decubitus was easy in every position, and that, if there were fever, it was scarcely perceptible? Who has observed the shrinking of the hands and fingers, (*maximè manuum et digitorum extenuatio*,"") and the peculiar fetor of the sputa, (*peculari puris fœtore*), that Borsieri himself describes, (loc. cit. § 62,) as characters of laryngeal phthisis? No one, that we know, and Franck himself, who, with Borsieri, regards these symptoms as belonging to laryngeal phthisis, avows he has never seen them.

Before the thesis of M. Cayol, Doctors Sauvée² and Laignelet,³ in their theses, had treated of various alterations that might give rise to laryngeal phthisis; and, about this period, M. Double read an interesting memoir before the Medical Society. This admirable pathologist endeavoured to prove, that laryngeal and tracheal phthisis, which had been considered distinct, were one and the same disease, differing only in situation; this opinion, though combated by Cayol, will be supported by us.

M. Papillon⁴ and M. Pravaz⁵ have also chosen this disease as the subject of their theses. The latter deserves great credit for the care with which he has collected interesting cases of cure, several of which we have quoted. Joseph Franck has also given us a complete and somewhat detailed account of this affection.⁶

We have only mentioned those authors who have produced monographs. It would be tedious and useless to give the list of all

¹ The reader is referred to the chapter on *Terminations*, in which we shall discuss the opinion of Borsieri.

² De la Phthisie Laryngée. Paris, 1806.

³ Recherches de la Phthisie Laryngée. Paris, 1806.

⁴ Du Larynx et de la Phthisie Laryngée. Paris, 1812.

⁵ De la Phthisie Laryngée. Paris, 1824.

⁶ Praxeos medicæ universæ præcepta. Lipsiæ. 1833.

who have contributed isolated facts, as we shall refer to them in the course of the work.

We must make honourable mention of the precious observations of Louis;¹ of those which Andral has published in his *Clinical Medicine*; and, finally, of those equally valuable remarks of Bouillaud on *œdematous laryngeal angina*.²

CHAPTER II.

ORGANIC ALTERATIONS.

WE must here speak, not only of the lesions that occupy the larynx itself, but of those found in the trachea, in the veil of the palate, and in the pharyngeal mucous membrane; finally, of those which invade the lung. We shall examine these alterations, only with a view to explain some mooted points in the history of laryngeal phthisis.

Anatomical alterations of the larynx will be divided into two great categories; those in which the mucous membrane is interested, and those which affect the cartilages.

A. *Alterations of the mucous membrane*.—Among the signs we are in the habit of regarding as indicating that chronic inflammation existed during life, redness, so often insisted upon, is truly the most uncertain. It is very important to insist upon this point, because numerous mistakes have been, and still are committed, through neglect of the pathological fact, that redness, how bright soever it have been during life, may completely disappear after death.

A few examples will render this apparent; first, as regards acute disorders. In erysipelas, in phlegmons, in confluent small-pox at the period of inflammation in the pustules, in chemosis, in high grades of fever when the tongue is often intensely red, do we not see, after death, pallor supplying the place of the bright tint, which had been the expression of intense inflammation during life? This fact is so clear and palpable, that all anatomists have observed it; though all have not noticed the inductions applicable to tissues that are invisible during life.

Will not the same laws that govern the capillary circulation of the skin, the conjunctiva, and the mucous membrane of the mouth, equally apply to the organs enclosed within the splanchnic cavities?

The same remarks may be made of chronic phlegmasiæ. The blood is seldom intimately combined with the tissues; it still cir-

¹ *Recherches Anatomico-pathologiques sur la phthisie*. Paris, 1825.

² *Dict. de Méd. et de Chirurg. pratiques*. Art. *Œdema*.

culates in its own vessels, and when life is extinct, the parts that were inflamed grow pale, as may be seen in chronic ophthalmia, ulcers of the skin, and severe cutaneous diseases. In some rare cases, however, the redness does not entirely disappear when the cruor has been combined with the tissues.

That sure guide in medicine, analogy, enables us to decide with great certainty in diseases of the larynx. If, when we depress the tongue and examine the pharynx, the tonsils, and veil of the palate, and perchance see the epiglottis, they are all deeply reddened; and still after death, find them bloodless and pale, may we not fairly assume that the same change had taken place in the larynx, and in the aryteno-epiglottidean ligaments?

We have purposely entered into all these details, which appear so useless. Here turns the grand question of œdema of the glottis, which shall be noticed pathologically, though we will first examine its anatomical relations.

Bayle, Laënnec, Cayol, Dupuytren, &c. &c. have decided for the existence of œdema, and rejected the idea of acute or chronic inflammation, from the circumstance of their seeing the aryteno-epiglottidean ligaments and the cordæ vocales pale and tumified. But from evidence we shall give, swelling, even without redness of the lips of the glottis, or laryngeal mucous membrane, is almost a certain sign of inflammation.

But if redness may disappear after death, intumescence may be subject to the same law.

Do we not observe phlegmons shrinking and the tumefaction of erysipelas disappearing after death; and, among chronic diseases, is it not common, in our hospitals, to see the tumefaction of the cellular tissue, induced by a disease of the bones, considerably diminished after death?

The fluids ever remain subject to physical laws and powers, and when these forces gain undivided sway, after the last sigh of the patient the blood that was in the vessels immediately flows by the anastomoses into the veins, and the fluids that had been effused into the cellular tissue gradually reach the most dependent situations.

The palpable neglect of these principles of pathological anatomy has given rise to serious errors, and has caused ingenious theories of the diseases of the larynx founded upon misinterpretation of facts.

Thus, when a child, affected with acute laryngitis, dies, after some hours of frightful suffering, as spasmodic action and remissions had been observed, and as, at the autopsy, no false membrane, abnormal redness, nor swelling sufficient to produce suffocation, are observed, it has been agreed that the case was spasmodic croup, a disease that may exist, though it would probably cease to be, were the foregoing remarks applied to anatomical lesions.

In the same way, when, in the course of a laryngeal phthisis, suffocation has closed the scene, as the swelling and redness may

not always suffice to explain this sad termination, they have brought in asthma or other nervous accidents, whereas the want of accordance between the pathological appearances and the symptoms belongs exclusively to the new circumstances in which the body was placed after death.

But this is not the only nor the greatest error to which a neglect of facts has given rise; œdema of the mucous membrane of the larynx, a disease which we will not call imaginary, though extremely rare, has been made to assume an important place in the list of nosology. It sufficed to find the vocal cords, and aryteno-epiglottic ligaments tumified and pale, with absence of inflammatory appearances, to make a new specific disease—*œdema of the glottis*.

We do not contend that there is no such disease, but believe we have seen an undoubted case of it.¹ We merely wish to attract attention to this fact, that tumefaction of the mucous membrane of the larynx is without redness almost always a sign of inflammation.

We intend to devote a chapter to the discussion of this controverted point of pathology, and we hope to show that what has been styled *œdema of the glottis*, is in most cases an inflammatory tumefaction, as M. Bouillaud has already stated.

But if redness and tumefaction do yield and sometimes disappear, when present they will possess an enhanced value. We have once seen the superior portion of the larynx of a livid red colour, and so swollen as to resemble the neck of the uterus. The dotted redness, so common on the inflamed mucous membrane of the trachea, is rarely seen on the epiglottis or larynx, which is owing to a lower degree of vascularity of this part, the mucous membrane being here dense and pale, and this is probably one of the causes of the pallor observed in a larynx that has been evidently inflamed.

We shall divide our subject into the consideration of *erosions* and *true ulcerations*.

Erosions.—These occupy the mucous lining, while ulcerations have their seat in the submucous cellular tissue, and sometimes even on a necrosed or carious cartilage. These erosions, so admirably described by M. Louis in his treatise on phthisis, often escape the notice of an inattentive observer; as the mucous coat seems only a little depressed, and so gradually that, as the edges are not red nor prominent, it is sometimes impossible to define the line of demarcation.

The character of this affection may be most readily perceived by submerging the part in water; when little villousities will be seen floating from the eroded surfaces, like the villi seen on a dog's stomach, but which are never seen in the air passages except where the epithelium has been destroyed.

It would seem that these erosions were but the first degree of

¹ This case will be reported under the head of the relations of œdematous laryngeal angina with laryngeal phthisis.

ulceration, and that the latter should be numerous, in proportion to the number of erosions; and reciprocally, that we should never find ulcerations without a coincidence of erosions. But this is not the case; indeed we have seen that part of the larynx, corresponding to the thyroid cartilage, converted into a vast ulcer, or rather a number of them, while the mucous membrane of the part offered no sign of erosion, although in the trachea and larynx it was covered with numerous erosions, without any deep ulcers. We say that we have never found erosions except in patients attacked with pulmonary phthisis, which observation would seem to justify the opinion of M. Louis, that these erosions are owing to the contact of pus, which is constantly passing over the mucous membrane of the larynx and bronchia. Admitting the fact, it remains to be explained why the trachea is oftener attacked than either the larynx or bronchia.

This fact might at first sight astonish us, for the principal bronchium of each lung would seem to be the part most frequently in contact with the pus; but it must be observed that the bronchia generally divide the burden, while the trachea has to bear it all.

If we further consider, what has not escaped M. Louis, that the posterior part of the trachea is most frequently attacked, this would be another reason for believing that the contact of pus is the most frequent cause of this lesion of the mucous membrane.

How plausible soever this hypothesis may at first sight appear, we must confess that analogy overthrows it entirely. We see, in the tuberculous, many and large ulcerations of the small intestine, which certainly have another cause than contact of pus. If, then, the tuberculous diathesis have invaded the crypts of the ileon where inflammation and ulceration could not have been induced by the flow of pus, must we not admit that it may be the same with the trachea and larynx, which, forming a part of the respiratory apparatus, would, by this intimate connection with the lungs, be still more disposed to be invaded by the tubercular affection?

There is moreover a remarkable difference between the form of the ulcerations of the intestine and the erosions of the trachea and larynx, found in phthisical patients. In the former, there are little hard, semi-cartilaginous masses which are often taken for tubercles, though without sufficient proof, whereas in the trachea and larynx the ulcerations never appear tubercular.

Whatever value may attach to these explanations of the origin of the erosions, which are coincident with tubercular pulmonary phthisis, we frankly confess that data are yet wanting to decide the question, and shall rest satisfied with mentioning the fact, which is worth more than any explanations.

Ulcerations.—Ulcerations sometimes invade the whole larynx, vocal cords, aryteno-epiglottidean ligaments and the mucous membrane which envelopes the epiglottis. When more deeply seated they attack the cartilages themselves, which become necrosed or carious.

In most cases they commence in the mucous membranes; in others, sub-mucous abscesses are found, and ulcerations result, like fistulous sores of the skin.

Finally, instead of communicating with an abscess, the ulcer may be in contact with a necrosed cartilaginous surface. We shall presently state how we conceive, that ulceration of the mucous membrane may bring on necrosis of the subjacent cartilage.

B. Alterations of the cartilages of the larynx.—Under this head we shall study the changes produced by laryngeal phthisis, in the thyroid, the cricoid, the arytenoids, and the epiglottis, although the latter fibro-cartilage rather appertains to the tongue than to the larynx. Still, as it most frequently partakes of the lesions of the latter organ, it should not be separated because of its anatomical relations, for we shall see it is necessarily included in a pathological history of the larynx.

Ossifications.—The ossification of these cartilages is purely a physiological phenomenon in the ordinary circumstances of life. In the progress of advancing years they become incrustated with earthy particles, and in old age they are commonly ossified. But in laryngeal phthisis of two years standing, ossification is developed, although the youth of the patient would seem to exclude such an organic modification.

Let us look to analogous cases for an explanation of this, or rather for proof that the phenomenon of ossification is common in conditions analogous to those in which the larynx is found in this disease.

If a bone be broken, inflammation is soon developed not only at the point of the fracture but in all the neighbouring tissues, especially in the periosteum. When the inflammation has existed about twenty days, the periosteum and the cellular tissue of the muscles and aponeuroses are gradually infiltrated with bony matter, and a considerable bony mass soon surrounds the fracture, constituting the celebrated clasp (*virole*) of Duhamel, the means of consolidation furnished by Providence.

The cartilages, being in fact the elementary framework of the bones, are subject to the same laws. Thus, when a costal cartilage is fractured, there is a bony infiltration into the perichondrium, and the cellular tissue of the mediastinum, and that without the pleura, participate in this change.

But these changes are equally observed, not merely when the bones or cartilages themselves are diseased, but, also, when the neighbouring tissues are under the influence of chronic inflammation. Thus, the periosteum becomes incrustated with bony salts along the course of a fistula that follows a bone, or in the neighbourhood of a cold abscess, and the costal cartilages are similarly affected, as every pathological anatomist knows, who has examined a case of cancer in the maminae, occurring in early life.

We must then admit, that the inflammatory afflux, which occurs near the periosteum or cartilages, excites in these tissues a patho-

logical action, in virtue of which an osseous secretion is effected—a remarkable phenomenon—inasmuch as inflammation, which has been considered an exaggeration of the vital powers, (we should say a perversion,) brings on the same results as senile weakness of the same powers.

If we now apply these remarks to the cartilages of the larynx, we shall better comprehend why their ossification is so common and premature a phenomenon in laryngeal phthisis. The bony matter is developed in irregular plates, and spread upon the surface of the cartilage, without observing the order maintained in the normal ossifications of the fœtus. At certain points, the whole thickness of the cartilage is converted into bone; at the edges, the ossification is jointed accurately into the cartilage, to which it is always superior, forming a superficial flake. When the ossification occupies the whole thickness of the thyroid and cricoid, the two bony plates advance from without inward, and embrace the remaining cartilaginous matter. When boiled, the bone separates from the cartilage just like an epiphysis.

Sometimes, especially in old subjects, the cartilages are completely transformed into bone.

The cricoid cartilage is most frequently affected, especially upon its posterior surface, next the thyroid. We have never seen the arytenoids ossified, and conclude they are more rarely affected than the others.

Ossification of the perichondrium.—The perichondrium may become ossified. We can as readily conceive this lesion as that of the costal cartilages, for the same laws regulate similar tissues.

Ossification may exist in laryngeal phthisis when there is no ulceration, nor even erosion, and in simple chronic laryngitis;—besides, the ossified part may not communicate with any fistulous track, nor with the bottom of an ulcer; in a word, it may be separated by hypertrophied cellular tissue from the ulcerated surfaces, or submucous walls of the abscess:—a very essential circumstance, when it becomes necessary to diagnosticate between ossification and necrosis, and very important to be established.

Necrosis of the cartilages.—This is a very frequent lesion, which we have found in more than half the subjects we have examined, though it has been scarcely mentioned by authors. This curious anatomical lesion presents itself under different forms.

1st. The necrosed portion is always completely denuded; this must be a permanent pathognomonic character, since dead parts will ever separate from living—but the separation here takes place in a peculiar manner. The necrosed portion is never covered by cellular tissue, but always completely naked, and on it rests the pus there secreted, or, it is the termination of a fistulous track opening into the larynx. We may find a sequestrum, as in the bones, but if the separation take place quickly between the sequestrum and the parts endowed with great vitality, as the cellular tissue or perichondrium, such is not the fact in regard to the rest

of the cartilage, from which it requires a long period to be eliminated.¹

2d. The necrosed portion is always ossified; this is a character which is never absent when laryngeal phthisis has continued for some time. In fevers of a grave type, known under the names of putrid, typhoid, dothinerite, gastro-enterite, &c. &c., we sometimes find in the larynx necrosis without ossification. Sédillot cites an example; (*Bulletin des Séances de l'Académie Royale de Médecine*, Dec. 1836.

If asked why we conceive ossification always accompanies necrosis, we should say that the ulcerative lesion, mostly if not always the cause of necrosis, commences by determining an inflammation of the perichondrium, and consequently an osseous effusion in the subjacent cartilage, according to the law we have already established. When the ulcerative process arrives at the ossified cartilage, this becomes necrosed with greater facility since ossification has deprived it of a great share of its vitality.

This explanation is the more plausible, because when ulcerative laryngeal phthisis runs its course rapidly, and when it occurs in young subjects, whose cartilages are yet very *active*, we do not observe necrosis, but *caries*.

Another proof is, that the laryngeal cartilages which we have never seen ossified, (the arytenoids,) never become necrosed but always carious, as does the epiglottis. We except the case of grave fevers, where necrosis is governed by a peculiar condition of the economy.

Previous ossification is then a necessary element in necrosis of the cartilages. It will be objected that in submucous abscess the cartilages are almost always ossified and necrosed. But we cannot suppose that these abscesses had commenced by denuding the cartilage which was first necrosed by the contact of pus and afterwards ossified. Indeed, in acute submucous abscess of the larynx, no one that we are aware of has seen necrosis, but merely a denudation—quite another affair—much less has any one beheld ossification in this case; but in chronic submucous abscess they may have seen ossification and necrosis, because the abscesses were consecutive to necrosis itself, that is to say, the sequestra, as foreign bodies, had acted, like other sequestra, in producing abscess, if the pus did not escape by fistulous openings, and then, we ask, how can necrosis precede ossification, how can the bony matter be deposited in a dead part, deprived of all vascular connections? Nevertheless, we do not deny that necrosis of the cartilages may occur in an acute case, and consequently without previous ossification; we have admitted its existence from fevers, it may also happen in diseases of the larynx, after phlegmon in the neck, &c.,

¹ A remarkable case is mentioned by J. Franck, (*Praxæos Med.*, vol. vi. p. 199:) “Æger Hunteri per plures menses sanguinem et pus rejiciebat, ac pro phthisico habitus fuit, convaluit rejectâ cartilagine cricoideâ.”

It is difficult to conceive that this cartilage should have been ejected whole, and the escape of such a considerable portion is exceedingly problematical.

and then we may comprehend how the necrosed portion, becoming a foreign body, may give rise to submucous abscess of the larynx, to fistulas, and to a fatal tumescence of the mucous membrane which clothes the chordæ vocales, but we have *never observed it*, nor can we meet with such a case in any writers upon this subject.

The truth of these remarks may be tested by reading cases No. 5, 21, 22, 24 and 25.

Caries of the cartilages.—We have just said that caries was less frequent than necrosis, we will now exhibit the conditions under which it occurs.—We have often observed it in the cartilaginous rings of the trachea, never in the cricoid cartilage; once in the thyroid, three times in the arytenoid, and once in the epiglottis. We have had our attention directed to this point but two years, before which we have, doubtlessly, often passed this lesion unobserved, for we have since seen it very frequently. Franck reports a case of caries, i. c. p. 203. “*Sæpissimè cartilaginem cricoideam carie erosam deteximus; semel tanta hujus cartilaginis erosio erat, ut margines illius ex utrâque parte dehiscentes, in pharyngem erosam prominèrent.*”

In caries, the ulcerations commence in the mucous membrane, and increase rapidly, the under submucous cellular tissue, so as to reach in a few months, perhaps weeks, the perichondrium and cartilages. The extreme rapidity of the march of these ulcers is explained by the fact that we have always found caries coinciding with tubercular pulmonary phthisis, a disease which it resembles in its fatal tendency to ulcerative and suppurative action.

Carefully examining the carious parts before dissection, there will be found considerable activity and vitality in the bottom of the ulceration, and the vascular villousities we mentioned when speaking of erosions of the mucous membrane. The dissected cartilage looks eroded or gnawed. This erosion may proceed to the complete destruction of the epiglottis¹ and arytenoid cartilages—even to the perforation of the thyroid itself, as was seen in case 24.

Mr. Andral cites a case in which ulceration had destroyed the parts to the skin, and established a fistulous air passage. This ulceration opened at the upper part of the angle formed by the two plates of the thyroid cartilage.²

All the cases of caries we have observed coincided with tubercular phthisis, which was not the case with necrosis, and this establishes a more marked line between the two alterations.

Lesions which accompany caries, necrosis and ulcerations. The lesions we have just been describing do not occur isolated, and they are almost always accompanied by other alterations even more menacing to life than themselves. In the same larynx caries may be found with necrosis and ulceration—but it is impossible that deep ulcerations should exist in the larynx, and that the cartilages

¹ Louis, Rech. Anat. Pat. sur la Phthisie, p. 251.

² Clinique Médicale, tom. ii. p. 204.

should be carious or necrosed, without the mucous membrane and subjacent cellular tissue being the seat of considerable inflammatory engorgement; cases, 1, 21, 24, 25, and 31, are striking examples.

But this inflammatory engorgement, so improperly called œdema by Bayle, becomes the immediate cause of death by suffocation. We have established by autopsy nine cases of œdema; two were acute, one developed by a very violent catarrh; another, a few hours after tracheotomy, seven were chronic, and of these five were complicated with necroses, caries and ulcerations, two with ulcerating tumours of the larynx. We shall return to this important discussion when treating of the relations between laryngeal phthisis and œdema of the glottis.

We have thought proper to commence this chapter with a general description of the alterations found in the larynx and trachea, and which commonly cause laryngeal phthisis; we have explained how observation taught us to recognise the relations of these alterations, their mode of formation, and their usual order of progression—we have now only to give a rapid sketch of the particular lesions mentioned by authors.

Foreign bodies, whether introduced, or of internal formation, may simulate or engender laryngitis.

Foreign bodies in the larynx.—Lieutaud relates the two following cases:

*"In cadavere cujusdam asthmatici triginta annorum, qui perpetuo querebatur de quodam impedimento in tracheâ quod tussi et screatu expellere sæpius conabatur, et morte subitanâ sublato, reperitur quidam polypus variis radicibus laryngi infixus, et versûs glottidem obturamenti instar adactus; unde suffocatio inexpectata."*¹

*"Secto cadavere cujusdam pueri duodecim annorum jampridem phthisici, et inexpectatâ morte rapti, in propatulum veniebat intrâ laryngem, corpus quoddam polyposum et racemosum e trachæ superiori parte pediculo unico et peculiari ortum trahens et hinc fluitans; quo fortè ad laryngem repulso, suffocationem obierat æger."*¹

These two cases are highly interesting, and it will be observed that he had underscored the word *asthmatici* in one, and *phthisici* in the other, as though he wished to indicate that the disease had simulated asthma and phthisis during life.

Desault in his long practice met but two cases of polypus, and the clinique of Pelletan does not contain a single example, hence we conclude that these excrescences must be extremely rare. We have seen one case, vid. observation 1. Dr. Senn, of Geneva, has cited one, vid. obs. 2, and a very interesting history of the same organic alteration was published by Dr. Romain Gerardin, vid. obs. 3.

¹ Hist. anatomico-medica, lib. iv. obs. 63 and 64.

OBSERVATION I.

•
Tubercular tumour and polypus of the larynx, without organic lesion of the lungs.

Mr. De Serry, aged 42, an élève of the Polytechnic school, had always enjoyed good health until 1834. In January his voice began to lose its natural sound, after which it was gradually extinguished until it became wholly aphonious. We commenced treatment about the close of 1834, and were so fortunate as to procure him some relief, which only lasted a few months.

About the first of July, 1835, he again perceived a difficulty of respiration, which, in a few days, increased so as to threaten suffocation. Justly alarmed at his condition, the patient, with his uncle, Mr. Hay, hastened to Paris to place himself again under my care.

On the 11th of July, 1835, when we saw him he enjoyed all his powers; his pulse beat from one hundred and fifteen to one hundred and twenty in a minute. The respiratory movement was performed twenty-eight times in the same period.

Both inspiration and expiration were performed with equal difficulty. The former was remarkable, and difficult to describe, and in its greatest intensity sometimes resembled the bellowing of a calf, sometimes the roaring of a lion.

In the evening the difficulty of respiration was increased; the night was passed in extreme agitation, and on the morning of the 12th, suffocation being imminent, we practised laryngotomy, in the presence of professors Fouquier and Roux, and doctors Hamard and Danyau.

A hemorrhage was the only accident that accompanied the operation, it was soon checked by light compression.

As soon as the canula was introduced, the oppression was relieved; respiration became easy, although somewhat irregular and hurried (40 in a minute.)

For five days after the operation, the patient did as well as could be expected; but at this time (the 16th) he began to complain of a pain in the right side, he had more frequent spells of coughing which were more fatiguing than before.

There was decided dulness on percussion at the base of the right lung, and above the liver. A pound of blood was drawn, cataplasms were applied to the painful part, and sinapisms to the extremities; nothing availed.

On the 17th we saw the patient with Mr. Fouquier, and observing the lips of the wound gaping, and suppuration checked, we prognosticated a fatal result. Indeed, the patient succumbed at five in the evening, (twenty-four hours after the access of the thoracic symptoms.)

Autopsy.—Sixteen hours after death cadaverous rigidity, decidedly jaundiced tint of the skin. An incision was made from the

point of the chin to the base of the sternum, and we first examined the larynx. This organ presented an œdematous tumefaction of all the left aryteno-epiglottidean ligament. This œdema consisted of a swelling which increased in size as it approached the larynx. Its greatest thickness was four lines. It was flabby and hung within the larynx, in such sort, that a forcible inspiration must have engaged it in that organ, so as materially to obstruct respiration. The right ligament maintained its natural appearance. The larynx, stripped of its muscles, did not appear tumefied, indeed the thyroid cartilage was slightly shrunk on the left side. The right lateral crico-arytenoid muscle, and the cellular and ligamentous tissue surrounding it, were of a greenish tint. At this point, so decidedly depressed in a state of health, there was an intumescence which increased on the posterior part.

The artificial opening extended from the inferior border of the thyroid cartilage to the lower edge of the first ring of the trachea. The canula occupied the crico-thyroid space.

On the posterior portion of the larynx when removed from its connections, we observed on the left side the greenish tint before mentioned, it extended nearly to the base of the arytenoid cartilage. The cellular tissue was here affected with œdema continuous with that of the aryteno-epiglottidean ligament.

The larynx was carefully opened on the posterior median line, the two sides of the incision were widely spread, and the following circumstances were remarked: all the left half of the mucous membrane had the greenish hue before mentioned. The inferior vocal cord was very much swollen, the superior one was less so. The left ventricle was bathed in an extremely fetid gray sanies, and occupied by an *accidental production of lardaceous consistence and of an ashy white colour*. This tumour was prolonged into the space that separates the cricoid from the posterior part of the thyroid, and appeared a little without and behind the larynx. A part of the left half of the thyroid was carious. This same *tumour extended out of the ventricle, and then assumed the consistence and tint of a mucous polypus, and reached some distance into the larynx*.

The left half of the larynx was from three to five lines thick, while the right side was but two or two and a half, and its mucous membrane, vocal cords, ventricle and cartilage were perfectly healthy. The mucous membrane of the trachea was tumefied and coloured with red spots; the bronchia were red, but without spots or tumefaction. Numerous intimate adhesions united the whole left lung to the costal pleura. The patient had never suffered with disease of the lung. At the summit and posteriorly, there was a little engorgement of the first degree.—No trace of tubercles. In the right pleura there was an effusion of three pounds of turbid, reddish serum; no false membranes; the pleuræ were no where adherent, but both were of a livid red colour.

All the inferior lobe of the right lung was of a marked wine lees

red; no crepitation, easily torn, and when cut there flowed a bloody, fetid, but not frothy liquid. On the sharp edge of this lobe there was a tumour whose gray colour contrasted strongly with the violet hue of the lung; when cut, there flowed an extremely fetid grayish sanies. This tumour was evidently a union of lobules attacked with sphacelus. The gases developed by putrefaction gave to this gangrenous portion its excess of volume. The other organs were not examined. The larynx was examined in the presence of MM. Broussais, Bouillaud, Duméril, Marjolin, Andral, J. Cloquet, and M. Sanson.

OBSERVATION II.¹

Tumour slowly developed in the larynx—Hoarseness for six years—Aphonia—Death by suffocation.

The twenty-second of December, 1826, I was called on by the authorities to make the examination of the body of Mr. Clavel, who had died suddenly in a baker's shop; I learned that the patient had long since lost his voice; that he had been treated for laryngeal phthisis; could not swallow liquids; was unable to take violent exercise, and that for two days he had complained of his throat.

The body being well developed did not announce phthisis. All the viscera were successively examined; there was venous injection, and the fluidity of blood consequent upon asphyxia, and they were all in a normal condition, with the exception of the larynx, which offered the following peculiarities: the epiglottis was healthy; there was slight œdema of the sides of the glottis and of the epiglottic ligaments; the mucous membrane was bloated; the larynx, opened from behind, exhibited *a tumour the size of a filbert, whitish, hard, fibrous, chapped, and pedunculated*, growing from the right ventricle which it filled, and occupying almost the whole of the upper part of the larynx, so that when this organ was closed it was exceedingly difficult to introduce a very small crow quill. This tumour, which appeared syphilitic, was the true cause of death; the slight swelling of the mucous membrane would have been sufficient, in this state of the larynx, to obstruct the passage of air. An inspection of the specimen would scarcely convince one of the existence of such an obstacle; but its progress must have been exceedingly slow, for the voice had been altered five or six years, and thus the system had become reconciled to the obstruction.

OBSERVATION III.²

M. Stassin, chief of the hussars of the chamber of deputies, aged sixty-three years, suddenly lost his voice, two years ago, without

¹ This case was published by M. Senn, of Geneva, in the *Journal des Progrès des Sc. Méd.* 1829, t. v. p. 230.

² Read before the Academy, Sept. 27, 1836, by M. R. Gérardin.

appreciable cause. Leeches were applied to the upper part of the sternum, a blister to the chest, afterwards tartar emetic plasters, simple fumigations, and finally alum gargles were used.—All these attempts were fruitless. He took cold at the beginning of last winter, and during the whole season had cough, with thick sputa. For some months he has had oppression and hissing on inspiration. The patient could not ascend the stairs to his chamber without great pain in respiration, and was even obliged to suspend conversation for want of breath.

Thinking that the air of Normandy would prove advantageous to him, M. Stassin anxiously waited the close of the session, that he might return to Bayeux.

On the thirteenth of July, 1836, on the eve of his departure, I was hastily called to see him—it was my first visit; he was sitting up in bed, panting, with hissing respiration; voice extinguished; cough hoarse; face red; eyes animated and prominent; in a word, there were all the symptoms of strangulation, with some indications of suffocative asthma. The skin was burning, pulse full and strong, the artery giving one hundred and thirty pulsations per minute. Some sputa in a vessel were thick and streaked with blood. I immediately practised venesection in the arm to the extent of fifteen ounces, which the patient bore wonderfully; some hours afterwards he was covered with perspiration, his aspect was more calm, and the pulse was diminished in force and frequency. 14th and 15th July, he continued better, notwithstanding some returns of the difficulty of breathing (*étouffement*.) Diet, pediluvium with mustard, enemata, emollient drinks, and a plaster (*vigo cum mercurio*) were prescribed.

16th. The night was not so good; the patient anticipated a renewal of the first symptoms, and demanded another blood-letting, which was practised, and followed, as before, by great perspiration and marked amelioration.

17th. New difficulty of breathing, very decided hissing; anxiety. I made another examination of the thorax; percussion was sonorous in its whole extent. The heart beat regularly and forcibly; no abnormal sound was detected. *There was no inspiratory sound*, though a slight bronchial rhoncus was heard with the cough. No redness nor pain in the bottom of the pharynx. The gullet might be pressed without producing any pain, which surprised the patient; fifteen leeches were applied at the summit of the sternum; slight melioration; no fever, pulse soft, the same drinks.

18th, 19th, and 20th. At the request of the patient we applied twenty more leeches, and a blister to the chest. The plaster of vigo was renewed; the sputa became more abundant and thick, and they were occasionally streaked with blood. The patient did not complain; his strength remained, and a light narcotic procured for him a few hours' sleep.

A week passed without any improvement, during which time the patient took three potions, in each of which was a dram of the white oxide of antimony.

Our hopes were dissipated, the prognosis was bad, and on the 28th a third bleeding became necessary. This blood, like the preceding, presented a thick clot, with little serum. On the surface of the coagulum were seen, for the first time, patches of the buffy coat. The patient was not relieved by it; the *malaise* and obstructed respiration continued; the strength sensibly failed; the sputa are more abundant and puriform; the moral energy of the patient continues the same; he has no apprehensions respecting the issue of his disease.

August 1st. The night has been worse, threatened suffocation induced me to bleed again; the coagulum was covered with a thick white crust. There was no improvement; the patient gradually lost his sensibility, and died on the 2d of August, at eleven o'clock, A. M.

In the evening, I asked to examine the body, but was refused, though permitted to make an incision into the neck, when I removed the larynx and part of the trachea.

The larynx was examined at my house: on raising the epiglottis, the glottis was found obstructed by a tumour; looking through the larynx, as through a spy-glass, it was observed that the passage for air was reduced to a sinuous passage, no larger than a chicken quill. Cutting into the posterior part of the larynx and trachea, and spreading the sides of the incision, there was found *a tumour as large as a filbert, of a white colour, covered with asperities, from one to two lines long. This vegetation had a short peduncle occupying the right sinus.* It seemed to be compressed by bringing together the sides of the incision, and to expand when they were extended.¹ This tumour was of the same colour as the lining membrane of the larynx and trachea, in which was neither redness nor ulceration. The tumour cut readily under the scalpel, without producing any noise.

M. Stassin had served under the republic in a regiment of hus-sars. He assured me that he had never contracted the venereal disease; and since his return to civic life, his conduct had been too well known to suspect the truth of his assertion.

Vegetations.—Syphilitic vegetations may invade the superior part of the air tubes: M. Rayer has preserved the most remarkable instance we have met with.² *Cancerous tumours* are oftener found in this situation than syphilitic growths. Morgagni has an example, (epist. 28, art. 9 and 10.) We have also met with a case, (obs. 18th.)

Tuberculous tumours and productions.—It is difficult to say whether the various alterations which we find in the larynx simul-

¹ I should explain the marked improvement which followed the venesection to the momentary collapse (*flétrissure*) of the tumour, which permitted a fresh entrance to the air; as well as to the relief given to the engorgement of the pulmonic circulation.—*Author's note.*

² *Traité des Maladies de la Peau.* Atlas, pl. xv. fig. 21, 2de édition.

taneously with tubercles in the lungs, should be ranked among tuberculous productions.

Most authors do not recognise the characters of tubercles in the granulations so frequently found in the larynx of phthisical patients, but consider them inflamed or engorged mucous follicles.

Louis says, tuberculous granulations are *never* found in the larynx, epiglottis, or trachea—whence he concludes, that we should regard inflammation as *the most frequent cause* of these ulcerations.

Andral (Clinique Médicale, tom. ii. p. 195) has often observed them, and thinks they are generally tuberculous.

We will not hazard an opinion upon so delicate a question, as our researches have not been sufficiently extended.

Analogous alterations in persons who have no tubercles in the lungs, will therefore be still more difficult to classify.

It seems more easy to assign the pathological place that should be occupied by tumours in the neighbourhood of the larynx or trachea, which sometimes simulate laryngeal phthisis, and which may even, in some cases, produce it, as would appear from Morgagni, epist. 15, art. 15, quoted by us in observation No. IV. It is evident, that such tumours often present every symptom of tubercle.

Observation VII., extracted from Irish Transactions, 1820, and No. V., communicated by M. Vernois, show in what respect these tumours may simulate laryngeal phthisis. In the last case, we see M. Andral deceives himself, inasmuch as there was no autopsy to show that the lungs were not tuberculous.

The numerous cases which we have reported will obviate the necessity of entering at length upon a consideration of the other alterations of the larynx, that precede, accompany, or follow pulmonary phthisis. We will merely refer to the relations M. Louis has observed to exist between the various alterations of the larynx, the trachea, and the epiglottis. This short statistical table, although generally known, may not be considered misplaced in a work especially devoted to the study of affections of these organs.

Of one hundred and two subjects examined by M. Louis, eighteen had ulceration of the epiglottis, twenty-three ulceration of the larynx, and thirty-one had lesions of the trachea.

We see here, that the frequency of ulceration is in the ratio of our descent from the external opening of the passage. We have already given what we conceive to be an explanation of this fact.

Ulceration of the epiglottis.—In eighteen cases reported by Louis, twelve were in men, six in women. Five times they occurred alone, and without complication with those of the larynx or trachea. They were generally superficial, twice only reposing on the fibro-cartilage, and, one instance only excepted, they were on the laryngeal face of the organ.

Lesions of the larynx were seen twenty-three times in one hundred and two patients; sixteen in men, seven in women. In only

two cases were they unconnected with similar affections of the epiglottis or trachea.

The order of frequency, as to the points of attack, was as follows: the union of vocal cords, the posterior part of the cords, the base of the arytenoids—the superior part of the larynx, and last, the interior of the ventricles, which were once found ulcerated.

Ulcerations of the trachea.—Of the thirty-one cases, nine were females, and twenty-two men. They occurred most frequently at the inferior part of the trachea, near the bifurcation, and when large they occupied the membranous portion; sometimes they were situate on the submucous tissue, at other times on the mucous tissue, which was sometimes thickened. Frequently, the cartilaginous rings were eroded; once only they offered a solution of continuity; and in five cases of the thirty-one, the mucous membrane was destroyed throughout the whole extent of the membranous portion of the trachea. We shall, at present, refrain from any inductions, but merely record the facts as observed.

Hydatids.—M. Pravaz relates the following case:—A captain of galley slaves was brought to the hospital nearly suffocated; respiration hissing, inspiration most difficult. All the means employed to assuage the patient's suffering proved unavailing, and after two and a half months he died.

The autopsic examination showed two connected, semitransparent oval hydatids, as large as a nut, lodged under the epiglottis; the right one occupied the corresponding ventricle of the larynx. There were two soft bodies in the upper part of the glottis, producing all the symptoms of the "œdematous laryngeal angina" of Bayle. This is an important case, because it is one that might have been relieved by pressure.

The plan of exercising compression, recommended by Thullier,¹ should not, however, be indiscriminately employed, because of the frequent inflammatory character of this disease.

False membranes.—Home, cited by Franck and Lieutaud, reports a case of false membrane cast off by a child, who had long suffered dyspnœa and altered voice: analogous false membranes were found in its trachea after death.

J. Franck has noticed a still more curious example:²

"*Vir conspicuus T., triginta annos natus, Grodni inhabitans, anno 1810, auxilium meum contra raucedinem, cum laryngis dolore, tussi clangosâ, suffocationis periculum minitante, sputis puriformibus, macie, febriculâ et deglutitione læsa (sine faucium visibili affectione) quasiverat. Morbum à refrigerio corporis in itinere contracto originem cæpisse putabat: neque minùs fassus est, juvenem se syphilide quidem infectum, sed benè curatum fuisse. Cura nihilominus à mercurio inchoata est, morbus autem in dies gravior exstitit. Atque sic quatuor hebdomadibus elapsis*

¹ Inaugural Thesis on œdematous laryngeal Angina.

² *Praxæos Medicæ*, tom. vi. p. 210.

æger Vilnam reliquit, aliorum medicorum curæ sese traditurus. Ab his multa et varia remedia diù frustra adhibita sunt. Tandem trium mensium spatio interjecto, à morbi autem initio mense nouo, vehementissime tussiens, pseudo-membranam trium pollicum longitudinis, uniusque latitudinis, expuit. A quo temporis momento, non solum ab omnibus suis malis liberatus, sed etiam obesus factus est."

Andral says that pseudo-membranous productions of chronic character are less rare than is generally supposed:¹ we have never seen them.

Calculi have been found in the ventricles of the larynx. The thesis of M. Pravaz, contains the following case:

A young lady for six years, at the close of each summer, had experienced anorexia, general indisposition, and difficulty of respiration; she had first a dry cough, then heat in the throat, and soon, an acute pain in the larynx; deglutition became more and more difficult, the voice was completely lost, and the dyspnœa was extreme.

When the finger was applied to the superior part of the larynx, there was found a small fixed tumour, circumscribed and painful. The mouth and pharynx were scarcely injected. Finally, the tumour increased, deglutition was impracticable, and the expectoration was purulent; the face was pallid, the lips livid, the voice extinct, and suffocation imminent.

This condition remained three days, when the patient spit up, without effort, two stones the size of peas; they were of a yellowish white colour, very hard, and of a rough irregular form. From the moment of their expulsion all the symptoms diminished, and the patient was completely restored.

Lieutaud (lib. 4, obs. 77) quotes the following account from Kerkringius:

"Quidam immani spirandi difficultate premebatur. Non tamen tussiebat nec excreabat, nullaque erant asthmatis nec orthopnœæ symptomata; cùm superveniente febre vehementiori, illuc mittitur unde negant redire quemquam."

"In propatulum veniebant varii lapides et diversæ figuræ, asperæ arteriæ immediatè incumbentes, adeò ut hominem præfocaverint."

Organic alterations of various forms and character may occur in the larynx and trachea, as in other mucous membranes; an enumeration of them would transcend our limits, therefore we shall not continue the subject. Nor should we have reported the preceding cases, but that they were considered types with which comparisons might be drawn with nearly all the accidental lesions of these important organs.

We have but a few remarks to offer respecting foreign bodies that may be introduced from without, and which often cause immediate

¹ Clinique Médicale, tom. ii. p. 195.

suffocation, or give rise to laryngeal phthisis, if not immediately ejected.

Every one is familiar with the history of Provençal quoted by Desault.¹

A cherry stone had fallen into the man's larynx; all the symptoms of laryngeal phthisis were manifested; Desault being consulted, proposed tracheotomy, which was refused; after suffering two years the patient died, and the nut was found in his larynx.

The same author² reports the case of a man, upon whom Ferrand had performed tracheotomy, with the view of extracting a stone that had got into his larynx; the operation failed, and the patient died—the stone had become lodged in the ventricles.

In all analogous cases, at least when the body does not act chemically upon the parts, suffocation is the most pressing danger, varying according to the size and asperities of the substance; but the indication is always to extract immediately, even when the symptoms abate. Temporising in this case may cause the death of the patient.

SHOULD LARYNGEAL TO BE SEPARATED FROM TRACHEAL PHTHISIS?

It will be seen that we have not acknowledged any distinction in the preceding pages, between the ulcerations of the two parts; therefore it may be best to give some explanation at this place.

Since the commencement of this century, and since M. Cayol's monograph upon the subject, most writers have recognised them as separate and distinct affections. We will now present our reasons for rejecting this arrangement.

It is admitted that the simple forms of both arise from the same circumstances, and under the influence of the same predisposing or exciting causes.

When they are symptomatic, the same diseases occasion both; thus, pulmonary tubercles cause more ulcerations of the larynx than syphilis; and ulcerations of the trachea are also more common with the former than with the latter disease.

They are frequently co-existent in the same patient, whether idiopathic or consecutive, and often occur simultaneously in both organs.

We are surprised that Cayol should have advanced a contrary opinion. In Louis' account of twenty-three patients with laryngeal ulcerations, there were but two whose tracheæ were not similarly affected.

The same thing has been observed by Lieutaud.³

"In cadavere cujusdam juvenis lue venerea laborantis occurrunt

¹ Œuvres Chirurgicales, tom. ii. page 258.

² Œuvres Chirurgicales, tom. ii. p. 274.

³ Historia Mat. Medic., lib. iv. obs. 81.

variæ exostoses in facie interna cranii. INTERIORA TRACHEÆ ET LARYNGIS LATERA PASSIM CARIE LÆSA CONSPICIEBANTUR. Pulmones deprehendebantur tuberculosi, cum thymo putrido. Variæ insuper conspiciebantur in abdomine viscerum læsiones, &c."

The same author, loc. cit. lib. 2, No. 767, reports the following:

"Secto cadavere cujusdam juvenis phthisici, præter vulgatissimam pulmonum stragem, LARYNX ET TRACHEA ULCUS SORDIDUM INTUS SITUM EXHIBEBANT. Thymus, &c."

Morgagni, (letter 15, artic. 13) says: *Eo loco, tunica laryngem convestiens erat ex ulcerata quemadmodum et quæ proximos annulos aliquot trachæ arteriæ operiebat; quanquam hîc levius."*

We are surprised that Cayol, who quotes this last passage, did not observe that the lesions of both organs were simultaneous; and that he should have denied the existence of the fact so positively.

We have thus combated the opinions of Cayol, because his name is considered authority on this subject. We could also array the opposing testimony of M. Double, of Borsieri, and of J. Franck.

MM. Louis and Andral have not clearly expressed their views on this point; but we may be allowed to infer from their writings, that they attach no great importance to the part of the air passages which may be affected with these alterations.

Cayol insists upon a difference of symptoms in the two forms. We confess ourselves unable to distinguish them from each other. It will be seen in our chapter on Symptoms, that patients with the larynx affected have pointed to the trachea and upper part of the sternum as the seat of pain.

The sensations of the patient are not generally important in making the anatomical diagnosis; and as to the orthopnœa which Cayol attributes exclusively to the ulceration of the trachea, our observations on tracheotomy, show the estimate we should have of his opinion. Upon Cayol's hypothesis, how should we explain the considerable amendment which generally follows the opening of the trachea? If the obstacle existed below the artificial opening, respiration would be no easier after the operation.

We do not consider it useless to distinguish the seat or place of the lesion, but it is not of sufficient importance to make two distinct affections, where the cause is similar, the anatomical lesion the same, and the treatment differs so little.

CHAPTER III.

CAUSES.

Laryngeal phthisis is not a disease *sui generis*, as it nearly always presents itself with similar anatomical forms. It may exist alone, and without our perceiving any thing in the economy to explain its development, but it is generally a consequence of some organic lesions which, once established, become a true cause of laryngeal phthisis.

These lesions are of an extremely varied *nature*, and if we embrace them all under the common denomination of laryngeal phthisis, it is because they generally provoke nearly similar functional disorders, depending rather upon the special destination of the organ, than upon their intimate nature.

To study the causes of these diverse lesions, it would be necessary to review the whole nosological table. The object may be best attained by simply reading our cases, which will be better than any theoretical discussions into which we might enter.

We have seen chronic laryngitis with or without ulceration, produced by an acute laryngeal angina, (obs. lix.,) by tracheotomy practised in croup, (obs. xv.,) by a sharp cry, (xlv.,) by habitual exercise of the voice, (xx. and xxxiii.,) by immoderate venery, (xii.,) by masturbation, (xiii.,) by periodical exanthemata, (xxxiv.,) by cancer, (xviii.,) by tumours in the larynx, (i. and seq.,) by syphilis, (xvi. and xvii.,) principally by phthisis pulmonalis, (xix. et alii.) In fine, those constitutions which are most inclined to develop chronic ulcerative diseases, and particularly the scrofulous and tuberculous constitutions, singularly predispose to this disease. All habits of life which favour the development of these constitutions may be considered as predisposing causes.

Internal or external tumours that compress these organs, may give rise to this disease, as appears in the following cases :

OBSERVATION IV.¹

Extreme dyspnœa—Dysphagia—Death—A suppurating tuberculous tumour opening into the trachea and compressing the air tubes and pharynx.

Mulier octogenariâ major, despirandi, deglutiendique difficultate, cum faucium ardore conjunctâ, multos jam dies querebatur, cum in nosocomium Patavinum excepta est. Ibi tam gravi paroxysmo difficilis respirationis corripitur, ut eo propemodum exanimetur. Servatur tamen, consequente sputo graveolentis puris, cui sanguis admistus erat. Cum mulier laryngem tanquàm morbi sedem non modo indicaret, sed digitis prehendendo antrorsum traheret, et sic

¹ Morgagni, De sed. et causis morb. Ep. 15, art. 15.

paulò faciliùs spiritum duceret; introspectæ sunt fauces, et uvula quidem, atque ascendentes ad ipsam musculosi arcus apparuerunt retrorsùm arcti; ut id pharyngis orificium, quod ad os est, dilatatum videretur, eaque loca paulò magis ruberent quam soleant; sed nihil præterea conspicerè licuit; sic dies quindecim, aut eo ampliùs, cum iis sputis et difficultate respirandi mulier perstitit, donec magis hâc urgente, irritis omnibus auxiliis, conficeretur circiter kalendas Septembris anni 1725.

Collum, in quo evidens erat morbi causam latere, dissectum est; eaque ad hunc modum inventa: In asperæ arteriæ tergo, intervallo transversî pollicis infra cartilaginem cricoideam, tumor excreverat ad magnitudinem dimidiatæ nucis juglandis, gulam quidem retropositam premens, sed arteriam illam multò magis; ut hujus viam ibi angustissimam redderet, in quâ per oblongam patebat scissuram. Hâc dilatâtâ, tumoris cavum inspectum est putridâ refertum materiâ, pariete autem comprehensum interiùs duro, exteriùs verò ex quibusdam quasi milii granulis facto subflavi coloris. Ex quibus duæ quoque constabant glandulæ, tumori extrinsecùs proximæ, singulæ modicum pisum æquantes; ut ex unâ, harum simili, sed magis adauctâ effectum esse tumorem appareret. Ex gulâ sectione perducta ad pharyngem, hæc intùs maximè rugosa comperta est, sic tamen, ut digitas rugas dissolvere liceret, pharyngemque ad amplitudinem justam reducere.

OBSERVATION V.¹

Suppurative tumour between the œsophagus and the cricoid cartilage—
Dysphagia, aphonia, symptoms of pulmonary phthisis in the last stage—
Death—Necrosis of the cricoid cartilage—Œdema of the glottis.

Mrs. Manque, of Paris, aged 64, a wine merchant, entered the hospital on the 4th of July, 1834. She has a delicate constitution; the pilous system is moderately developed; the muscles presented the appearance of the first stage of marasmus. Few details of the previous history could be obtained, as the patient articulated with great difficulty.

She had not been rheumatic, not subject to take cold, had never spit blood, nor been asthmatic. Ten years ago she had a pleurisy, with pain in the left side which lasted twenty days; since then she has had neither cough nor dyspnœa. One month ago she had a violent fever, with delirium, which her physician told her was characteristic of pleurisy (*fluxion de poitrine*.) Of this she recollects no symptoms, but was bled thrice in two days, and had blisters applied over the left posterior side of her thorax.

Menstruation commenced at 16 and continued regular until 47, when it ceased; she has had three children.

She was taken about three weeks ago, soon after leaving Hôtel

¹ Communicated by M. Vernois, Interne of the hospitals.

Dieu, where she had her last illness. This affection commenced with a dull pain in the posterior region of the gullet, so that difficulty of swallowing was one of the first symptoms.

Difficulty of respiration appeared soon after, and continued to increase, causing a very fatiguing cough, with viscid liquid expectoration. She retained her appetite, but was obliged to adopt a restricted diet because of the pain in the larynx and œsophagus; she began to have regurgitations.

Her debility, on leaving l'Hôtel Dieu, was increased by these causes as well as by a copious serous diarrhœa. The voice was perceptibly altered; she had employed no treatment for the affection, and at last, urged by the serious nature of the symptoms, she came to La Pitié.

On the visit of the 4th she was as follows:—Hair thin, fair and gray; skin dry; extreme debility, supination, but on an elevated plane.

Confusion, (*étourdissemens*), vertigo, and constant tinnitus aurium; no pain in the limbs; intellect clear; at intervals considerable faintness; nothing remarkable about the eyes; the pupils perhaps a little contracted; nostrils dry; lips violet, tongue partaking somewhat of this colour; thirst so great that she can scarcely satisfy it; anorexia; very difficult deglutition; frequent regurgitation of food; sense of weight and constriction in the pharynx; no pain in the epigastrium; abdomen sunken, neither tympanitic nor painful. Many stools of diarrhœa; urine scanty; no perspiration.

Frequent cough, with very frothy muco-purulent expectoration. Voice very hoarse; considerable dyspnœa; respiration hurried, (thirty-six in a minute;) slight pain in the larynx when pressed; loud tracheal rattle.

Auscultation was not carefully attended to, but the respiratory murmur was soft and clear; *diagnosis, phthisis in the last stage.*

Prescription: a cup of the white decoction of Sydenham, and a draught with one ounce of the syrup of poppies.

6th. The same general condition; at times the dyspnœa becomes much more violent; no sleep.—Continue the same treatment.

7th, 8th, and 9th. During these days the dyspnœa made great progress; the patient could scarcely swallow a few mouthfuls of tisan, and vomited three fourths of it, which was attributed to the ulceration of the epiglottis and the pain caused by the contact of liquid with these parts. The volume and form of the neck in the region of the larynx were not observed. The voice was lost, and the patient was in imminent danger of asphyxia. On the 9th, at the morning visit, the pulse was sometimes hard, and again imperceptible. The cough and expectoration disappeared, and the symptoms increasing in intensity. She died on the 10th, at one in the morning.

I opened the body on the 12th, at eight in the morning. Effusion of yellow limpid serum in the pleuritic cavities, (about a pound,)

very strong old adhesions near the base of the left lung, none on the right. The lungs were of a bluish colour, they floated on water, and were engorged with black blood. No tubercles. When about to detach the larynx, I felt a tumour at its posterior part which strongly compressed the œsophagus; I dissected out the parts with care—the œsophagus was somewhat contracted opposite the tumour, but not perceptibly dilated above. There was no communication between the tumour and the trachea or œsophagus. There was fluctuation, and when opened there was nearly half an ounce of concrete, thick, yellow, greenish pus, which had detached all the submucous cellular tissue from the upper part of the larynx, and thrust back forcibly the mucous membrane of the œsophagus.

The cavity would have held a large nut; its walls were fringed with false membranes, composed of many yellowish, purulent layers. The surrounding cellular tissue was friable, but without purulent fistulæ. The cricoid cartilage was entirely denuded, its edges were carious, resembling the pumice stone, and above they were hard, and appeared ossified. The glottis was quite deformed; its lips, or borders and the two cords that bound the inferior part of the ventricles, were swollen, and completely obliterated the opening into the trachea. Holding it up like a spy-glass, scarcely a ray of light could be seen. The rest of the mucous membrane was red and injected, but presented no ulceration, except the epiglottis, which was somewhat œdematous. The other parts of the larynx and bronchia were not altered; the trachea contained frothy mucus.

Heart.—The whole tissue engorged with black blood; the right cavities filled with bluish coagula; valves healthy.

Stomach.—Of a grayish colour, very much shrivelled, and with corrugations on its inner face. Intestines without remarkable alteration. The colour, alone, presented a few scattered patches of red. The uterus was small, and contained many little pedunculated hydatids, which seemed to grow from the mucous membrane itself.

Kidneys and bladder healthy. The brain was not examined.

We here see that a tumour between the œsophagus and cricoid cartilage occasioned not only all the symptoms of laryngeal phthisis, but those also of phthisis pulmonalis, so much so that M. Andral, from a superficial examination, it is true, made a diagnosis of phthisis pulmonalis in the last stage.

It is true that the abscess prevented deglutition as well as respiration, so that the patient must have died from hunger as well as asphyxia; thus we see the lungs were engorged with black blood, and the stomach was shrunk. We value this observation because it presents two causes of death, and confirms what we have said respecting the manner in which death may occur in this disease.

OBSERVATION VI.¹

Violent effort to avoid falling—Pain at the upper part of the sternum—Tumour in front of the trachea—Death—Tumour on the right of the trachea—Destruction of three of its rings by the abscess communicating with the trachea—No tubercles in the lungs.

A woman of 40, who had always enjoyed excellent health, while sitting in a chair one day, made a violent effort to avoid a threatened fall, and at the same instant experienced an acute pain at the upper part of the sternum which continued for some days; after a remission of two weeks it returned, and with it a tumour was developed in front of the trachea, which was dissipated, and the pain relieved by a plaster.

Eight months later there was cephalalgia, with difficulty of respiration, which increased for two months and compelled the patient to enter the Hôpital de l'Unité, when she had the following symptoms:—slight alteration of features; respiration laboured, sometimes threatening suffocation; a slight, rather painful swelling above the sternum and in front of the trachea; cough frequent; sputa and mucus abundant; deglutition difficult and painful at the moment when the portion of food passed that part of the œsophagus which corresponded to the disease; pulse small, corded (*serré*,) frequent.

M. Corvisart suspected a tumour in the walls of the trachea, and made an unfavourable prognosis. *Treatment palliative.*

After two weeks, as all the symptoms decreased, we entertained some hope that the tumour might be discussed.

A few days later, the first pus was observed in the sputa, which continued to increase in quantity. 16th. Blisters to the arm.

19th. Exasperation of the symptoms; respiration very difficult; upright posture absolutely necessary; sinking.

20th. Cadaverous expression; functions disturbed.

21st. Death.

Autopsy.—Lungs sound throughout; a small tumour was observed near the bifurcation of the trachea extending two inches along its right side. The interior of this tumour was brown; three of the subjacent rings and the corresponding mucous membrane were half destroyed, and a communication was thus established with the trachea. The rest of the mucous membrane was engorged, and covered with brownish mucus, mixed with a white substance like that observed in the sputa.

OBSERVATION VII.²

Pain in the throat—Dysphagia—Dyspnœa—Threatened suffocation—Tracheotomy—Complete dysphagia—Death—A considerable abscess compressing the trachea and œsophagus and communicating with the upper part of the larynx by erosion.

A woman had been suffering for a month with pain in the throat and difficulty of swallowing, which continued to increase

¹ Extracted from the Thesis of M. A. Sauvée.

² Irish Transactions of 1820.

notwithstanding general and local venesections had been practised.

Dr. Carmichaël found the patient in such a state that he thought immediate tracheotomy necessary.

There was some hemorrhage, which was soon arrested; respiration was performed by the artificial opening, which relieved the patient, but deglutition continued almost impracticable. A gum elastic tube could not be introduced into the œsophagus, and the patient could not be fed; three days after the operation she threw up a quantity of pus, and expired.

Autopsy.—An abscess, extending from the second or third vertebra to the sixth or seventh, compressed the œsophagus and upper part of the trachea. It communicated with the larynx by a very small erosion; in other respects the whole respiratory apparatus was in a good state.

Independently of these causes relative to the constitution, there are still two whose consideration is difficult—*age and sex*.

Age.—Laryngeal phthisis is rarely developed before the age of puberty and is uncommon in advanced life. Of all the cases we have seen or quoted, there were few patients less than twenty or more than fifty years old; they were generally between their thirtieth and fiftieth years; the observations XI. and LIX. though relating to infants, were decided cases of laryngeal phthisis, and under No. XV. are related two instances of its following tracheotomy. The same remark has been made by all authors who have written upon this subject.

J. Franck¹ expresses himself as follows:—"Si infantes phthisi laryngeæ venereæ affectos excipiam, fateri debeo, omnes ægrætos pubertatis epocham superasse; plurimi inter 30 et 40 ætatis annum versabantur."

Sex.—According to a series of observations made from 1816 to 1821 by M. Serres, at La Pitié, and those by M. Louis in his beautiful work on consumption, it has been established that, among the tuberculous at least, these alterations are more frequent among men than women. We refer the reader for a more detailed account to our chapter on organic alterations. Franck, whose authority we are glad to cite, because his remarks show that this singular influence of sex is not observed in France alone, thus expresses himself, tom. vi. p. 206:—

"Solùm novem feminas inter ægros meos invenio et inter istas quinque morbum ex syphilide acquisivêre. Quæ observatio, si cum illâ in capite præcedente allatâ comparatur, patet laryngem marium reverà longè magis quàm illum feminarum morbis obnoxium esse. Intereâ et observationem contrariam experientia mea suppeditat; die enim 17 mensis Octobr. 1816 pro viro phthisi laryngeâ laborante in consilium vocatus sum, qui se jam tres sorores eodem morbo amisisse retulit."

¹ Praxeos Medicæ, tom. vi. p. 206.

These remarks relative to age and sex agree remarkably ; indeed we find women less liable to alterations of the larynx than men ; and children, whose constitutions are so analogous to those of the more delicate sex, partake of the same immunities.

As exciting causes of laryngitis, we find acute affections of the larynx, forced exercise of the voice, frequently renewed colds, repression of *dartrous* affections, blows, falls, wounds, chills, foreign bodies, &c.—These causes will be the more apt to produce laryngitis according as the patient may have the taint of either of the constitutions which predispose to it, and according to the time he may have been exposed to the influences above mentioned.

CHAPTER IV.

SPECIES.

1st. It is difficult to classify diseases so as to satisfy both the imagination and truth. If we look at the results of the efforts to establish a good nosological classification made by so many eminent men since the time of Sauvages, we shall almost conclude that it is superhuman to effect one.

It is because diseases are complex, depending upon the causes that produced them and the constitution in which they occur, and liable to be modified by many circumstances. They are functions, not entities, and these abnormal functions, like normal ones, may vary in every individual, and in every condition of life where they occur.

Whether, then, we class diseases according to symptoms or anatomical lesions, which are both cause and effect, we shall omit one of the elements of the problem, and have a defective classification.

We have entered into these details in order to meet the objections that may be urged against our arrangement, and to show the value we attach to it.

We shall divide laryngeal phthisis into four principal species:—

1st. *Simple laryngeal phthisis*—Under which head we shall embrace that produced by causes common to other phlegmasiæ. Some eminent physicians of the present day refuse to admit the existence of laryngitis, independent of consumption ; before the discovery of auscultation, and in the infancy of pathological anatomy, we may conceive that diseases of the larynx, complicated with softening of tubercles, may have been frequently considered simple laryngitis. Thus, the partisans of the opinion against which we are contending, are always complaining of the inaccuracy of the earlier observations, arguing from the inadequate means of thoracic exploration, that obtained before the time of Laennec.

It was important to collect the testimony of physicians who, having before proclaimed the isolated existence of laryngeal phthisis, could since, by the aid of this valuable diagnostic means, verify their prior views.

M. Double, who was one of the first in France (*Séances de la Société de Médecine*, an. XIV.) to point out the existence of laryngitis, independently of pulmonary tuberculisations, has since been able to collect new facts, which, by the aid of autopsy or auscultation, have confirmed his earlier convictions. His opinion, which he has communicated to us at consultations and scientific meetings, may be expressed in these terms:—

“Laryngeal phthisis is undoubtedly often united with pulmonary phthisis; but it is frequently unaccompanied by any lesion of the lungs. Many facts, proved by symptomatology, auscultation, and autopsy, establish this proposition.”

Cayol, who some years later held the same views, continued to support them; and we have heard the renowned Laennec himself, show by relating numerous facts observed in his practice, the independent existence of laryngitis. (See the observations VIII, IX, X, XI, XII, XIII, XIV, and XV.)

2d. *Syphilitic*:—that which is produced by venereal ulcers, primitive or consecutive, whether they attacked the larynx, in the first place, or were propagated from the pharynx. (Observations Nos. XVI, XVII, XLIX, (1, 2, 3,) L, and LI.)

3d. *Cancerous*:—that which arises from a cancerous tumour in the larynx. (Observation No. XVIII.)

4th. *Tubercular laryngeal phthisis*:—that which commences after the manifestation of pulmonary tubercles. (Observations Nos. XIX, XX, XXI, XXII, (1st and 2d.))

Perhaps we should admit the existence of another, which we would call *dartreuse*; but we have not yet a sufficient number of facts to establish this as a species. We shall, nevertheless, present the following case:

Miss ———, aged twenty-one, was taken with an eczema of the scalp, which soon left that position, and spread to the face, then to the alæ nasi, and to the interior of the nasal fossæ, when the face was cured. The nasal fossæ soon recovered, but a severe sore throat was the consequence; as that got well, an obstinate cough, with almost complete extinction of the voice, supervened. Topical treatment was applied to the larynx; the symptoms disappeared, but the eczema returned to the fossæ and alæ nasi, whence it was dispelled by the treatment, and in a fortnight the larynx was again seized. It was agreed to adopt general treatment by sulphur baths, mercurials, and bitter tisans; the symptoms soon disappeared, but the patient is still liable to become hoarse from the slightest cause.

EXAMPLES OF SIMPLE LARYNGEAL PHTHISIS.

OBSERVATION VIII.¹

Repeated colds.—Increasing dyspnœa.—Hemoptysis.—Voice shrill, then hoarse.—Death in the sixteenth month.—Glandular granulations in the larynx and trachea.—No tubercles in the lungs.

I knew a female, of about thirty, who had been very subject to catarrhal attacks, which terminated in spitting of blood, and great difficulty of breathing. She would never consent to being bled; the menstrual discharge was suppressed, and a pain appeared in the larynx. The voice was first shrill, afterwards hoarse. She could not be relieved by any change of position: her breathing was equally painful, whether she reclined or sat up, though the respiration was rather less painful when the head was inclined towards the thorax; her pulse was corded and frequent. She died about the sixth month of the attack, *without having suffered remarkable sweats, or colliquative diarrhœa.*

An inspection showed that the seat of the disease was in the larynx and trachea: the lining membrane was red, and covered with glandular granulations that partially occluded the air passage: the two largest were in the larynx. *The lungs were healthy;* only the vessels seemed rather fuller than usual, and the right auricle and ventricle contained a good deal of blood.

According to Portal, pulmonary phthisis often follows laryngeal and tracheal; *because, says he, the lungs are the last to be affected.*

In this case, although deficient in detail, we see that the patient died from slow asphyxia. There was no marasmus; respiration was always laboured; the patient was obliged to incline the head forward to get breath; and, finally, the lungs, their vessels, and those of the systemic circulation, were in that state of engorgement which commonly follows death by asphyxia.

OBSERVATION IX.²

Repeated colds.—Hæmoptysis.—Aphonia.—Tumefaction of the larynx.—Emollient treatment.—Death.—Ulceration of one of the arytenoids, and of one of the aryteno-epiglottic ligaments.—No pulmonary tubercles.

A nailer, aged thirty, large and of strong constitution, entered the Hospital. He has been sick for a long time, and has been frequently attacked with colds.

¹ Extracted from Portal's work on the Nature and Treatment of Phthisis. Paris, 1809, p. 189.

² From the Thesis of M. Sauvée.

The disease commenced with a considerable hæmoptysis, which recurred, after a few days, in a milder form.

Face lean, features altered, tongue natural; no pain in the throat; loss of voice; larynx increased in size. The thorax was sonorous throughout; no pain.

The larynx, though not painful, seemed to be the only affected point. Professor Corvisart *suspected ulceration of its membrane, and gave an unfavourable prognosis.*

Diluent drinks, and fumigations with tepid water, were prescribed.

23d. The same state; some pain within the larynx. A blister was applied over the painful spot; the same regimen.

24th. Remarkable improvement, cough rare, painful, mucous sputa.

26th. Return of the pain in the throat, difficult deglutition, entire extinction of the voice, insomnolence.

All the symptoms were exasperated in the beginning of the month, and an obstinate diarrhœa weakened the patient.

12th. Expectoration, for the first time, of muco-purulent matter; cough very painful and fatiguing.

15th. The three preceding days have been passed in extreme suffering, and agony. Death.

Autopsy.—The emaciation was much less than that observed in persons who die of pulmonary phthisis. The upper part of the pharynx seemed to be partially closed. One of the arytenoid cartilages was ulcerated. The left superior ligament of the glottis was destroyed by the same ulceration.

Nothing remarkable was observed on opening the thorax.

OBSERVATION IX. (2D.¹)

General emphysema of the lungs.—Organic affection of the heart.—Death from asphyxia.—Œdematous, phlegmonous, and ulcerative laryngitis, unobserved during life.

Godard Louis, aged sixty years, a carman from the department of Aisne, was brought to the Pitié on the 7th of December. Though blessed with an extremely robust constitution, he was attacked with a general pulmonary emphysema. He also had a disease of the heart, which had been pronounced hypertrophy of the left ventricle, and slight obstruction of the aorta. Being threatened with asphyxia, when he came, he was relieved by general bloodletting and blisters. Still, he occasionally relapsed into the same condition, when attempting to sit up a little. At last, one of these attacks was longer; he was considerably reduced, and, among other phenomena, the voice was observed to be nearly lost; but there was no other symptom that attracted attention to the larynx: the patient

¹ Recorded by M. Fournet, Interne of the hospitals.

experienced no pain there, and the circumstance was attributed to his extreme debility.

The last day of his existence, the aphonia became complete; respiration was very high, difficult, laboured, braying, hoarse, and having a dull sound in both inspiration and expiration. Death occurred on the 30th of December, 1836.

The autopsic examination was made the next day, twenty hours after death. There was considerable pulmonary emphysema; serous effusion into the pleuritic cavities; considerable hypertrophy of the left ventricle, with insufficiency of the left auriculo-ventricular valve, and plates of ossification on the internal face of the aorta.

We were astonished to find the larynx and trachea affected as follows:—

Their lining membrane was of a very lively red, with little whitish spots, each of which was a superficial ulcer, embracing almost the whole thickness of the mucous membrane. The ulcerations were most numerous towards the superior opening of the larynx. Two of the largest were situated upon the upper ligaments of the glottis, and extended to the epiglottis and to the aryteno-epiglottic ligaments. A considerable swelling, rather œdematous than phlegmonous, occupied the whole cavity of the larynx, and nearly obliterated the lateral ventricles. The aryteno-epiglottic ligaments were affected with considerable œdematous swelling throughout. All these alterations were greater at the upper part of the larynx, decreased rapidly towards the trachea, and disappeared about its middle.

OBSERVATION X.¹

Acute catarrh, with pain in the throat, and increased hoarseness.—Emollient treatment.—Improvement.—Relapse.—Sharp pain in the larynx.—Severe cough, purulent sputa.—Voice dull and cavernous.—Death on the forty-third day.—Ulceration of the laryngeal mucous membrane.—Caries of the arytenoids.—Trachea untouched, lungs sound.

A female, of thirty, was taken with cold and fever, sore throat, and mucous expectoration. The larynx soon became painful, and there was some hoarseness. Gentle remedies and laxatives afforded relief; but on the thirty-third day, the patient was imprudent in her regimen, and the disease became more violent.

There was no pain in the thorax, but it was very severe in the larynx. The fever became high, and the cough extremely fatiguing; the sputa soon presented a purulent aspect. The cough, which was deep and dull, might be compared to the bellowing of an ox; and the patient expired on the forty-third day.

Autopsy.—There was ulceration of the mucous membrane of the

¹ Journ. de Méd. de Corvisart, Leroux, et Boyer, vol. ix. p. 185.

larynx; the arytenoid cartilages were carious, and covered with purulent sanies that exhaled a very fetid odour. The trachea was not affected; the œsophagus preserved its integrity, and *the lungs were very healthy*, as were all the thoracic viscera.

The examination of the abdomen presented nothing worthy of note."

OBSERVATION XI.¹

N——, æt. twelve, of a sanguine temperament, was taken with an acute fever and delirium.

The fourth day, there was pain in the throat; voice hoarse and sibilant: (emollient fumigations, and a blister to the larynx.)

The eighth day, the disease seemed to incline towards a favourable termination.

On the seventeenth, the pain in the larynx was more marked; deglutition of fluids was difficult, cough frequent, pulse small, accelerated. Expectoration abundant; the features altered; finally, after sweats and colliquative diarrhœa, the patient died about the end of a month.

Autopsy.—The larynx contained a grayish liquid; the epiglottis was thinned; the cricoid cartilage was thickened in some places, and ulcerated at others.

Unfortunately, M. Laignelet does not inform us of the lungs, though it is presumable that he would not have failed to mention any important alterations that might have presented themselves.

OBSERVATION XII.²

N——, æt. eighteen, a barber, of lymphatic temperament, *after excessive venery*, experienced pain in the larynx; the voice changed, the respiration gradually became difficult; he occasionally threw off mouthfuls of frothy, red blood, and in the evening he had irregular general chills.

After suffering five months, he entered Hôtel-Dieu; when he had general emaciation, pale skin, sunken eyes, sharp features, a bright blush on the cheeks, intense pain in the throat, voice more altered, sputa purulent and lumpy, night sweats, and small, frequent pulse.

He died after staying four months in the hospital.

Autopsy.—The whole laryngeal mucous membrane was ulcerated, as were many points of the arytenoid cartilages.

The lungs offered no alteration.

¹ Extracted from the Thesis of M. Laignelet.

² Ibid.

OBSERVATION XIII.¹

N—, æt. twenty, of feeble constitution, *addicted to masturbation* since he was fifteen, about a year ago experienced pains in the larynx, afterwards alteration of the voice; at first it was shrill, and then entirely lost. Towards the last, deglutition of liquids became impracticable; the expectoration purulent and abundant; the pulse corded and frequent; and he finally died, after about a year's illness.

On opening the body, *the lungs were found healthy*, the arytenoid glands ulcerated, and most of the glandular crypts of the laryngeal mucous membrane were either tubercular or ulcerated.

OBSERVATION XIV.²

Colds, with loss of voice.—Slow progress of the affection at first, and afterwards increased frequency of the paroxysms of asthma.—Death.—Considerable induration of the soft part of the larynx.—No tubercles.

Cugney, æt. forty-nine, was an errand-man, native of Paris, robust constitution, and had served nine years as a soldier. His only previous indisposition had been two severe colds.

In 1834, he was violently kicked by a horse, and though knocked down, he suffered no other inconvenience than oppression of breathing and loss of voice, which passed off in eight days. Six months afterwards, in the midst of his laborious exercises, which compelled him to speak constantly, he was taken insensibly with loss of voice, which gradually increased, and was accompanied with cough and considerable oppression. These symptoms generally occurred at night. He employed no treatment. Since his entrance into l'Hôtel-Dieu, (February 6th, 1835,) to the 4th of March, he had three attacks of asthma, which were so intense as to threaten asphyxia: two of these paroxysms occurred in the evening, the other at night. They all yielded rapidly under the influence of blisters and hot sinapisms³ to the front part of the neck. Leeches were also applied to the same region; but all these means were but temporary, their good effects lasting only a few days; after which he relapsed into the same state.

On the 2d of March he was in the following condition:—Considerable emaciation; respiration difficult, continued, and sonorous; hissing and hoarse inspiration; expiration, on the contrary, easy, and without any sound. On auscultation, the vesicular murmur was only heard at very limited points; but, in its place, there was

¹ From M. Laignelet's Thesis.

² Communicated by M. Fournet.

³ We supposed that *hot sinapisms* were no longer employed, since the discovery that the globules of mustard were coagulated by heat, and rendered almost inert.—*Translator.*

a braying, sonorous, sibilant tracheal respiration; percussion gave a dull sound at every part of the chest; the voice was hoarse, slender, difficult, and laboured; the cough was harsh, braying, and dry; the expectoration was sometimes white, thick, not homogeneous; sometimes formed of little brownish masses, thick, mixed with blood, rather frothy, and with little whitish muco-purulent masses scattered through it. The beats of the heart were regular, without abnormal sound, but strong and lasting, especially the first. The larynx was very moveable; not painful, easily grasped, and preserved its natural form.

On the 2d of March, I first tried catheterism of the air-passages; but the gum-elastic sound, used without the stilet, was stopped at the glottis, beyond which it could not pass.

The 3d of March, the attempts at catheterism were renewed with a tube bent at an obtuse angle, and by carrying the beak of the sound as nearly as possible on the median line, I could easily make it pass between the superior vocal cords; then withdrawing the style, while the index finger, in the pharynx, held the sound, so as to avoid injuring the parts of the larynx against which it rested, it was easily pushed into the bronchia; and by withdrawing and advancing it alternately, I could assure myself that there was no tumour in the trachea.

Immediately after another attempt in the evening, the patient forcibly ejected a compact dense sputum, which was composed of brown, yellow, and whitish purulent matter, streaked with blood. After the catheterism of the 3d of March, he again threw up a similar mass, but smaller, more yellowish, and before the operation he had raised a large yellow mass, mixed with white pieces. This kind of expectoration occurred at other periods; sometimes he coughed convulsively for some instants, and was suddenly relieved by ejecting one of these muco-purulent masses; sometimes they were forcibly ejected by a simple effort of expectoration, without cough. He always felt relieved, as though these masses had been foreign bodies introduced into the larynx from without.

It is important to observe, that in each of the catheterisms that were practised, the epiglottis was standing vertically, so that the instrument penetrated the glottis without the necessity of raising the organ with my finger.

The patient was generally free from fever. If, at the moment of one of the inspirations, the trachea was grasped by the thumb and finger, it was felt to dilate sensibly; it is true, this sensation was increased by the previous collapsed state of the trachea at the moment of inspiration; but, taking this into the account, the dilatation was still quite manifest. On the morning of the 5th of March the patient died in one of the intervals of calm, or of partial relief that separated the paroxysms.

Autopsy twenty-eight hours after death.

Larynx and trachea.—There was no malformation on the exterior of the larynx, except that instead of the crico-thyroid fossa,

there was a decided prominence owing to the induration and swelling of the soft parts, and indeed this was verified upon dissection, for the crico-thyroid membrane, the cellular tissue, and the submucous follicles appeared almost cartilaginous, and were three lines thick. Before dissecting off the indurated parts, it was impossible to move the thyroid on the cricoid cartilage at their juncture; the membranes that unite the thyroid to the hyoid bone retained their natural laxity and pliancy; and their movements were free.

The epiglottis was placed vertically, and so maintained by the retraction, swelling, and induration of the middle glosso-epiglottic ligament, and the neighbouring soft parts. If it was depressed upon the opening of the glottis, it instantly resumed its vertical position when the pressure was removed; the summit, in consequence of unequal contraction on one side, seemed to have deserted the median line to incline towards the side where it was drawn by the greater thickening and induration of its ligaments.

The latter glosso-epiglottic ligaments were tense and voluminous, and formed resisting borders to the glottis, which circumscribed and diminished its diameters.

On a careful examination of the degree of contraction of the space between the right and left vocal cord, I observed, 1st, that it was most remarkable opposite the inferior cords; that the thickening of these ligaments was such that they were in contact for the lower three fourths of their extent, and even compressed each other; and that, opposite the arytenoid cartilages, there was a lozenge-shaped opening two lines long, by one or more broad; 2dly, on the contrary, through the whole extent of the superior cords, there was but a slight diminution of the space that naturally exists between them.

Immediately below the contraction there was a dense, thickened, viscid sputum, precisely similar to the masses above described.

The swelling and induration of the interior of the larynx had caused the complete occlusion of the lateral ventricles; though it was rather a closure of their orifice than of their cavity. When in juxtaposition, the vocal cords of each side presented a plain surface, behind which was the ventricle, so that, at first sight, it conveyed the impression that the vocal cords and the cavities between them had been entirely destroyed by ulcerative action.

After observing these different transformations of structure, I carefully examined the other alterations of the larynx.

First. The mucous membrane of the epiglottis, indeed of all the neighbouring parts without the larynx, was reddened, and this colour increased in proportion as we approached the interior of the organ. On the inferior face of the epiglottis the redness was more marked, and there was a thickening and softening which increased towards the inferior part of the larynx. In the whole of this extent the surface was sprinkled with whitish granulations, which were easily removed by the forceps, and which were merely engorged and softened mucous follicles. At the lower part of the larynx the mucous membrane insensibly lost its thickening and redness; at the

top of the trachea there was a large red ecchymosed patch; through the rest of this organ there was occasional redness, which gradually became paler, and *almost entirely* disappeared in the bronchia. Throughout the whole extent of the membrane that we examined, there was no trace of ulceration.

Secondly. When the mucous tissue was raised, a great many of softened granules were observed, similar to those mentioned in a preceding paragraph.

Thirdly. The cellular tissue surrounding the thyro-arytenoid and lateral crico-arytenoid muscles had acquired a thickness of four lines, and a schirrous hardness; it grated under the scalpel like true lardaceous tissue.

Fourthly. The thyro-arytenoid and lateral crico-arytenoid muscles alone were altered, scattered, and almost lost in the schirrous cellular tissue, but were still readily identified by the direction of their fibres and by their pale colour.

Fifthly. The parcel of granules that compose the gland of the epiglottis was much swollen, and their tissue softened.

Sixthly. With the exception of some points on the thyroid, and the complete ossification of the posterior part of the cricoid cartilage, the skeleton was not at all changed; the first three rings of the trachea were united into one, though two irregular lines marked the places of their primitive separation.

Lungs—both were adherent throughout by strong and abundant cellular tissue. There were two kinds of alterations at different points. First. The most common was a reddish brown tissue, easily torn, containing a great many very large air bubbles that started out upon compressing the cut surfaces. This tissue was engorged with blood, intimately combined with it, and not merely effused; so that it was almost impossible to express it, or wash it off. The colour, and want of resistance, made it resemble red hepatisation; but, on the other hand, it possessed characters that constituted it very distinct from the alteration of the first stage of pneumonia. Secondly. In some limited points the pulmonary tissue was of a grayish, brownish red, and of a consistence that reminded one of the alteration known as carnification of the lungs. This portion was destitute of air bubbles; a little engorgement was found in circumscribed parts of the lateral anterior regions, but there was a great deal of emphysema. It is doubtful whether either of the lungs contained one or two cubic inches fit for respiration.

OBSERVATION XV.

Chronic laryngitis succeeding croup.

Mitler, aged five years, was tracheotomised in the last stage of croup.

The symptoms disappeared, and on the fifteenth day we removed the canula. Six weeks afterwards, the voice, which had never been quite restored, began to fail; the little patient experienced some dyspnœa after violent exercise, going up stairs, running, or even walking fast.

The inspiration was sibilant, especially when he spoke much, or recited his lesson. These symptoms continued for three weeks, at which time we were consulted. A powder of one dram of alum to one ounce of sugar was blown into his larynx four times a day, and in a few days he was cured.

A similar fact.—The same thing occurred with young Branville, aged seven years, who had also been operated on in the same way in a severe attack of croup. In his case, insufflations were not necessary; revulsives and pediluvia, gradually diminished the oppression, and the mucous membrane of the larynx completely relieved itself.

EXAMPLES OF SYPHILITIC LARYNGEAL PHTHISIS.

OBSERVATION XVI.

M. P., aged thirty-six, living in Auxerre, called upon us on the third of January, 1834, for an aphonia that had commenced three years ago, and which had been complete for six months. He gave the history of the disease as follows:

Ten or twelve years ago he contracted a blennorrhagia, and eighteen months afterwards he had chancres on the corona glandis. He was very mildly treated; the blennorrhagia yielded in two or three months to emollients followed by balsam copaiba, and the chancres were treated by mercurials; they soon yielded, and the patient, then a young man, tired of pursuing a treatment which appeared futile, threw aside the medicines as soon as the ulcers were healed. He continued to enjoy good health until 1830, at which time he frequently had a sore throat, with hoarseness, and some difficulty in swallowing. Emollients and leeches generally dissipated these symptoms, the gravity of which was not suspected by the patient.

In the course of 1832 the voice was perceptibly altered, and the sore throat was almost unremitting, though M. P. did not become alarmed, because he attributed these derangements of his health to the fatigue to which he was exposed, and to the continual efforts of the voice which he was obliged to make in his occupation.

Towards the middle of 1833 the pain in the throat became per-

manent, the difficulty of deglutition increased, and the voice daily lost its natural sonorous tones. At the same time his appetite diminished, and his ordinary freshness of colour was replaced by a yellowish tint and precocious wrinkles.

Notwithstanding all these symptoms, wishing to relieve his father from care, he continued his rude profession, following the prescription of M. Paradis, which was no doubt very judicious, but being without avail, he came to place himself under our charge.

Present state.—The patient seemed to be a man of strong constitution; his temperament sanguineous, eyes bright, movements quick, appearance intelligent. He complained of a pain in the throat, which for three months had almost prevented him from swallowing liquid or solid food; during the same period he had suffered with a wry-neck, that had kept his head turned towards the right shoulder. The patient could scarcely obtain a few minutes' rest, tormented as he was by the pain that the slightest involuntary motion caused him while asleep. The antero-superior border of the left trapezius muscle, and its insertion on the same side were painful under pressure.

The voice was nearly extinct, and the patient obliged to speak low. When he raised his voice, the first syllables only were heard. No decided inflammation was found in the mouth; the tonsils, the pharynx, and the veil of the palate were *perhaps* a little red, an indication of chronic inflammation or congestion. There was no uvula, nor any cicatrix in its place, and his parents declared that he had always had a nasal voice.

Externally, the laryngeal region was decidedly swelled; pressure on the thyroid cartilage gave some pain.

There was no fever; the appetite, although diminished, was so good that the patient blamed his sore throat, because it prevented his gratifying it. The digestive functions were unimpaired; the respiratory murmur pure throughout the thorax. There was an occasional slight, dry cough, caused by a sort of titillation in the throat; no spitting of blood: he expectorated some small rounded, viscid, transparent, and occasionally yellowish sputa.

There was considerable dyspnœa (*essoufflement*) when the patient walked fast, or went up stairs.

Our first visit was in the evening. We sent the patient to bed, and applied an ammoniacal blister to the affected part of the trapezius, which was spread with a grain of the sulphate of morphia, and prescribed frictions morning and night, with the following:—

R. Ung. hydrarg. fort. ʒj.
Hydriod. potass. grs. xxxvj. M.

The next morning, he was delighted to have slept the whole night; his wry neck had disappeared, and he was charmed with turning his head in every direction. We touched the gullet and larynx with a solution of equal parts of water and nitrate of silver. The frictions to be continued.

Four days later, the pain in the throat had nearly disappeared; the patient swallowed food and drinks with pleasure; the voice was *perhaps* rather less cracked.

We laid aside the topical application of morphia to the blister; the wry neck did not return. We directed the patient to touch his throat with a solution of nitrate of silver, which he could easily do with a little instrument that we gave him. The frictions were continued.

After twenty days of this treatment, during which M. P. took four baths, and used full but mild diet, the voice recovered its natural volume, or nearly so, for his friends had forgotten the original sound, which they had not heard for so long a time.

There was no pain in the throat, notwithstanding the frequent exposure to cold and moisture on the banks of the river. The dyspnœa (*essoufflement*) had disappeared.

Suspecting that syphilis had something to do with the disease from which M. P. had been so happily relieved, we proposed a mercurial treatment. He took a bath of the sublimate; but business called him to Paris, whither he went, and laid aside all treatment.

Twelve days had scarcely elapsed, when the pain in the throat returned. The patient wrote for the formula of the solution of nitrate of silver: it was sent, and all the symptoms disappeared under its use.

Returning to Auxerre, he took cold in the carriage; and when he arrived he had pain in the throat, and the wry neck had reappeared: two days of the same treatment sufficed to overcome these symptoms, and the patient, thinking himself cured, neglected the general means above mentioned, and married about August or September.

During this period we had removed to Paris. On the 18th of November we received a letter from M. P. announcing his arrival, and begging our attendance.

On the 19th, we found him suffering a good deal with his throat, and with a considerable extinction of the voice. At the base of the left tonsil, at its junction with the tongue, there was a circumscribed but deep ulcer, surrounded by a very dark circle of inflammatory redness. The whole aspect of this ulceration had something suspicious about it, though not precisely like a true venereal chancre.

We urged perfect rest, directed him carefully to avoid cold and moisture, and touched the ulcer with a solution of eight grains of the sublimate and two grains of opium to an ounce of water, and at the same time ordered pills of the proto-iodide of mercury.

The patient could not swallow the pills, which were rejected by the nose, and on account of his business could not remain in doors. In spite of the cold, wet weather, he daily left his room at six o'clock, and went about town to sell his goods, exposing himself to all changes of temperature. Besides, he was obliged to speak

constantly to his workmen, which he admitted was very fatiguing to his throat.

We substituted the liquor of Van Swieten for the pills of proto-iodide of mercury, but as his stomach would not bear it, we were forced to lay it aside. He objected to the mercurial baths, which rendered him very sensitive to cold. We dared not use mercurial frictions to one exposed the whole day to cold and moisture, and were limited to local applications, hoping that our patient would take rest, and undergo a methodical treatment, as soon as he had finished his business.

On the 22d of December, the ulceration was completely cured, and the pain almost gone, but the voice was still cracked, (*violée*;) the patient went to Auxerre, where he promised us he would adopt suitable treatment.

He did nothing.

On the 23d of February, 1835, we saw him again in Paris. The pain in the throat had returned; the whole pharynx was red, and the tonsils were much tumefied, but no ulceration was observed. There was intense headach; the face was red, the eyes injected; the pulse, natural in frequency, was full and hard.

We prescribed confinement to his room, an emollient gargle, sinapised pediluvia night and morning, and twelve leeches to the anus.

The patient, still engaged with his business, instead of keeping his chamber, remained in the open air, exposed to the wind and rain, from morning till night. The pediluvium and gargle having diminished the pain in the throat, he neglected the leeches, because he was unwilling to lose the time.

We saw him on the 2d of March: he said that he had suffered greatly with his throat for three days. We examined him, and were alarmed to observe that the left tonsil was half destroyed by a very deep chancre, as large as a five-sous piece; its prominent and ragged edges, and its grayish base, but too plainly disclosed its venereal character. The patient was afflicted, and promised to do every thing we might ask.

We again recommended rest, which he much needed. We applied the twelve leeches to the anus, and touched the ulcer according to the method of M. Malapert, with a solution of sublimate eight grains, opium two grains, and water one ounce.

We again tried the liquor of Van Swieten, with which we associated a solution of the extract of opium, to be added at the moment it was used: we gave a tisan of sarsaparilla.

Four days of this treatment stopped the progress of the ulcer; its edges sank, it assumed a better appearance, and was less painful. From this time the patient resumed his labours, despite all our repeated advice, counting, he said, upon our prescriptions. The ulcer was completely healed at the end of eighteen days, notwithstanding the exposure to cold and damp, and although M. P. had merely touched it with the mercurial solution for a fortnight.

He had to return to Auxerre; and on the 24th of March, the day of his departure, he attracted our attention to the swelling of his feet that had just appeared. This symptom, added to considerable emaciation, loss of appetite, and general debility, seemed a bad omen.

He had scarcely reached home when the œdema increased; and as diarrhœa supervened, the antivenereal treatment was necessarily suspended.

Although every thing was done, for two months, to combat the serous infiltration, it would not yield, but reached the peritoneum, and the patient finally died about the first of June. During the latter stage of the disease, he did not suffer any pain in the throat.

He had taken internally five grains of the sublimate during the whole course of his disorder, and three baths with three drams to each.

There was no autopsy.

M. Paradis wrote, that with a most careful examination of the chest during life, he had been unable to discover any sign of pulmonary disease. We had made the same remark.

OBSERVATION XVII.

Syphilitic laryngeal phthisis.—Mercurial treatment.—Cure.

Rousset, a cook, aged thirty-one years, large and of good constitution, a blonde, with a lymphatico-sanguine temperament.

She was married and had two children, one of whom died at birth, the other at the age of forty days. She has never been sick; her mother died in childbed, and her father, at fifty-two, enjoys good health, except an *asthma*, which is very troublesome. Almost every day he has a fit of coughing, which expels a good deal of mucus, and then ceases for the rest of the day. This he attributes to the dust he inhales at his occupation of baking.

The patient has never had cold until last February, when she was taken with a severe catarrh that required several bloodlettings, and lasted three months.

While suffering under this cold, she was suddenly taken with hoarseness when sitting on a stone bench. This continued, despite the removal of the catarrh, and went on increasing until the voice became completely extinct.

Present state, (September 18th, 1835.) Complete aphonia, slight cough, *little pain in the throat*. The patient, who has always been short breathed, says the dyspnœa has increased since the appearance of the aphonia. The least exertion causes quick and laboured respiration, though the sound is free and pure throughout the chest.

There is no pain in the larynx, even under considerable pressure. The pharynx is not red; the tonsils are the seat of a circumscribed

redness, without decided tumefaction. The right one presents a solution of continuity, which resembles an old cicatrization.

The skin is florid and soft; her *embonpoint*, although diminished by indisposition, is still considerable. There is no other inconvenience than the aphonia. Appetite good, digestion easy, menstruation regular, no fever.

Prescription.—Rest.

28th September. Same state.

Prescription.—Make ten inspirations a-day with a portion of powder composed of one eighth acetate of lead and seven eighths of powdered sugar-candy.

25th. The patient finds her voice somewhat restored: we can hear her more easily.

Same prescription.

1st of October. The voice is decidedly stronger and clearer, the general health is good; the patient, who never has any pain in the throat, complains that for three months she has felt an acute pain in the right ear when she swallowed. The throat being carefully examined, it was perceived that the right tonsil is the seat of two or three small ulcerations; superficial, but of a suspicious aspect. The left tonsil has a slight erosion of its mucous membrane. The bones of the nose have been a little swollen for a fortnight; the skin over the tumour is red, tense, and painful on pressure. She says that sometimes during the past year, she has passed purulent matter by the nose. She denies having ever had any thing that would lead her to suspect a venereal disease. Her husband has had it for fifteen months, but has abstained from connection during his indisposition?

Same prescription.

3d of October. The voice is still stronger and clearer. The general health continues good. The physician who takes charge of the ward laid aside the saturnine inspirations.

8th of October. The voice is little changed. She expresses herself better than yesterday, because she had obtained some of the powder of the acetate of lead, which she had used, contrary to the prescription of the physician.

The patient, having left the hospital, came to consult us. The voice is the same; the tumour on the left side of the bones of the nose is less red, but painful to the touch: looking at the handkerchief we saw that the mucus was mixed with yellow, greenish purulent matter, streaked with blood and without odour. The respiration was easy by each nostril, the throat was not painful to the touch or on swallowing; the slight ulcerations of the tonsils were flattened, but not entirely dissipated. We touched the larynx with the nitrate of silver, although she had her menstrual discharge.

13th. The voice is still about the same, perhaps a little stronger. We touched again with the nitrate of silver.

15th. Same state; touched again with the caustic. The nose is as before.

20th. The patient is chilly; the voice is again completely lost; the nose still suppurates freely; the external swelling continues, and is perhaps increased. Suspecting a venereal affection, we prescribed the pills of Dupuytren, (three per diem,) and the tisan of guaiacum and sarsaparilla. Topical applications were laid aside.

23d. The same state continues; perhaps the voice is rather clearer. We prescribed, besides the pills and tisan, six inspirations a day, of

℞. Hydr. chlor. mit. ℥ss.
Hydrar. perox. grs. xii.
Pulv. sacch. purific. ℥ss. M.

27th. The voice is better; the nose in the same state.

30th. The melioration, though slight, continues appreciable. Same prescription.

8th November. All treatment has been laid aside since the 2d, because she had no money to purchase medicines;—the voice is sensibly improved; the nose is less swollen and red; suppuration continues. We persuaded her to resume the treatment, and we substituted the tisan of bitter-sweet for the sarsaparilla.

14th. The improvement goes on increasing; the voice is almost natural; the nose runs as before, but is less red and less tumefied.

Same prescription.

The patient being destitute of means, and unable to pursue the treatment, we persuaded her to enter the Hôtel-Dieu; she was admitted into the ward of M. Récamier; we called to see her at the end of a week, and found she had left the day before.

5th of February, 1836. We met the patient, who was coming, she said, to give us an account of herself.

She had been twenty-four days at the hospital St. Louis, where she had been subjected to an anti-syphilitic treatment of sarsaparilla tisan, sudorific syrup, and pills of proto-chloride of mercury.

Her voice is natural; the nose had ulcerated externally while she was in the hospital, but the cicatrix is now firm. The nasal mucus is still purulent and sometimes bloody.

The tonsils have deep ulcers. The general health is good.

She has been urged to claim our advice by the physicians of St. Louis, who regretted her leaving them.

We prescribed the pills of Dupuytren. We again saw her after she had followed our treatment for some time, and was perfectly cured.

EXAMPLE OF CANCEROUS LARYNGEAL PHTHISIS.

OBSERVATION XVIII.

Hoarseness—Oppression—Orthopnœa—Threatened suffocation—Tracheotomy—Improvement—Introduction of a permanent sound—Death eleven months and a half after the operation—Tubercles in the lungs, some of which were softened—Carcinomatous tumour in the larynx—Destruction of the cartilages.

Mrs. P., aged thirty-two years, wife of a wine-merchant, has always enjoyed good health; none of her kindred have suffered with phthisis. There is nothing to induce a suspicion of syphilis. In August she went to Versailles; exposed herself in the park, and returned with a hoarseness that nothing could control.

Her general health continues good; she has never had hæmoptysis, oppression, nor cough.

In September, 1834, more than two years after this occurrence, there was complete extinction of voice.

In the beginning of December there was some oppression and shortness of breath when the patient walked fast.

15th December. The oppression, which had hitherto been slight, now became constant during the night, and there are occasional fits of suffocation.

1st of January. The paroxysms become more intense and frequent; sometimes they seem to threaten asphyxia. The family, justly alarmed, called us in consultation with MM. Gendron, Hymely, and Guillon. It was decided that tracheotomy was the only resource, but that it should be postponed as long as possible.

6th of January. Asphyxia was so imminent that we were called in the night to perform the operation; which terminated happily, except a venous hemorrhage, which was checked by compression.

From the instant the air had free access to the lungs by the artificial opening, she experienced a great improvement.

10th January. She sat up, and on the 1st of February went to her neighbour, Dr. Evrat, who was affected with a similar disease, to persuade him to undergo the same operation.

For five months the improvement continued. She constantly wore a canula in the trachea, and when she wished to speak she closed the aperture with her finger. Towards the third month she could in this way articulate some words at the top of her voice.

In September, 1835, eight months after the operation, the tumour, which had remained stationary at the left side of the larynx, began to increase rapidly, and soon appeared between the upper border of the wound and the canula. Ulceration was soon set up, and frequent hemorrhages resulted.

On the 15th of November, she was suddenly attacked with fever, with a stitch in the side, and with a very fatiguing cough. On

the left side of the thorax all the signs of pleuritic effusion were observed. Hectic fever ensued, and the patient died about the 10th of December, 1835.

Autopsy.—The lungs offered many tubercles, some of which were softened.

A considerable purulent effusion occupied the left pleuritic sac.

The thyroid gland was decidedly hypertrophied, though its tissue was sound.

The *larynx* was the seat of extremely serious lesions. A great many tumours of variable size, isolated or grouped, occupied all the interior of the larynx, the epiglottis, and a part of the trachea; externally, they projected considerably above the canula, and before the larynx, making a tumour as large as a middle-sized apple. They were here uneven and irregular, and the skin over them was livid, thin, and ulcerated.

On each side, principally on the left, and before the thyroid body, there were a great many similar little tumours in the cellular tissue.

Within the larynx, at the points unoccupied by the tumours, the mucous membrane was ulcerated and fungous. The aryteno-epiglottic ligament of the right side was healthy, except a slight swelling of the mucous membrane; the left ligament was converted into an irregular mass, of the same nature as the tumours.

The cartilages of the larynx were broken, and the fragments were found in the tumours.

The tonsils were healthy, except a slight tumefaction. The œsophagus, was so contracted at its commencement, that it was not more than two lines in diameter.

Cutting into the tumours we have attempted to describe, a few of them were consistent, and creaked under the scalpel, having the colour of the inside of a horse-chestnut, and resembling, in consistence, encephaloid, rather than tubercular tumours,—while the smoothness and colour of the cut made them analogous to tubercular ganglions.

The others were softened and converted into yellowish matter.

M. Cruveilhier, to whom we showed the specimen, pronounced the affection to have been of a cancerous character.

EXAMPLES OF TUBERCULAR LARYNGEAL PHTHISIS.

OBSERVATION XIX.¹

Tubercular laryngeal phthisis—Suppurated pulmonary tubercles—Deep ulcerations of the larynx—Destruction of the epiglottis.

A gardener, aged thirty-three years, tall, of a lymphatic and sanguine temperament, of a strong constitution and good figure, came

¹ Louis, *Recherches sur la Phthisie*, p. 254.

to the hospital of La Charité, on the 6th of September, 1824. Five years before, he had peripneumonia, after which respiration remained perfectly clear, and from an earlier period he had been subject to a hoarseness which recurred every winter. He attributed his indisposition to a sickly season, and had discontinued his labours for six weeks. At first there was cough, with irregular chills, and clear and rare sputa, like broken saliva. The cough continued; the sputa have been rather less clear and more abundant for four months. He has always been very sensitive to cold; the least depression of the temperature gave him a chill. He has had almost constant copious night-sweats, and the fever has increased for the last six months. For the last three, the voice has been somewhat changed; the upper part of the larynx has become the seat of acute pain, and for six weeks drinks have been occasionally rejected by the nose. The appetite had been diminished from the first; for some time digestion has been bad, and there has been occasional vomiting during the cough. No pain in the epigastrium; no pleuritic affection; no hæmoptysis; emaciation has been advancing for three months.

Seventh September, face rather pale, debility, insomnolence from the cough; hoarseness, voice broken, extremely cracked. Constant sharp pain between the thyroid cartilage and hyoid bone, with dryness and heat, increased by the cough, by speaking, by bending the neck, and by deglutition, which is often difficult, and provokes the rejection by the nose of part of the drinks. The cough is frequent; oppression during the night; a few opaque, yellowish or greenish sputa floated or were at the bottom of an abundant transparent fluid. The chest gives a clear sound on both sides anteriorly. Pressure is painful under the left clavicle, the expiration tracheal; under the right the respiration seemed rather stronger than natural; between the shoulders it was bronchial, and the voice very ringing—pulse moderately accelerated, heat natural, tongue and pharynx in a healthy state, epigastrium not painful. The patient had a good stool during the night, and only complained of the pain in the throat. Prescr.—*Looch, potion gommée, deux crèmes de riz.* (A linctus, gum water, and two portions of rice.)

The pain continues. There was for some days only a slight heat in the larynx. Constant aphonia, sputa, greenish and thick. Diarrhœa supervened, with loss of appetite, and continued, without interruption, from the 15th to the 31st, when he died. In the mean time, the epigastrium was sensitive to pressure, and the patient imagined he perceived pulsation with the pain. The tongue continued natural.

Autopsy.—*Neck.*—There were numerous little ulcers scattered over the base of the tongue and the inferior parts of the pharynx.

The epiglottis, the lateral ligaments, and the superior vocal cords were entirely, and the inferior cords were partially destroyed. Almost all the surface corresponding to this destruction had an uneven aspect, a reddened colour, and some hardness. The aryte-

noid cartilages were healthy, and their articular surface naked. The mucous membrane of the trachea was of a delicate rose colour, of a natural thickness and consistence.

Thorax.—The lungs were voluminous, and the pulmonary vesicles were generally dilated. The right lung adhered throughout, the left was perfectly free, and had at the summit a sort of depression which corresponded to a small hard mass of gray semi-transparent matter, placed half an inch from the surface, whence a number of rays of the same character were sent off. Near it was a cavity of medium size, furnished with a false membrane, and some portions of hepatised lung. In other parts there were many gray semi-transparent granulations, which decreased from the summit to the base of the organ. In the upper lobe of the right lung there was a considerable excavation, communicating with another in the lower lobe. They contained a red, thick opaque fluid, and were tapestried with a gray, firm, semi-transparent false membrane. The rest of the superior lobe contained many softened tubercles and gray granulations, which were numerous in the lower lobe. Heart and aorta in a natural condition.

OBSERVATION XX.¹

Pulmonary phthisis, ten months afterwards symptoms of laryngeal phthisis.

—Death after three years.—Larynx ulcerated.—Lungs tuberculous.

N—, crier, aged forty years, very robust, and of a sanguine temperament, had, during his infancy, two attacks of quinsy at the age of puberty, nasal hemorrhage, and at thirty-four, hæmoptysis. From that time he occasionally felt pain in the chest; the cough, at first dry, was afterwards accompanied with purulent sputa, and with chills in the evening, and night sweats, chiefly on the thorax.

A year and a half after the establishment of the pulmonary phthisis, symptoms of laryngeal phthisis were developed; the voice was gradually lost; the larynx became more voluminous and painful to the touch; liquids were swallowed with pain; marasmus finally ensued, and the patient died after three years of suffering.

Autopsy.—The lungs were tuberculous at some points, in others, ulcerated, and containing *foyers* of pus. The laryngeal mucous membrane was very much ulcerated.

OBSERVATION XXI.

Laryngeal, after pulmonary phthisis.—Aphonia for eighteen months.—Prior history unknown.—Death.—Remarkable alteration of the larynx.—A tubercular excavation healed.

A mason, aged forty-four years, entered the wards of the Clinique of the Medical Faculty of Paris.

¹ Extracted from the Thesis of M. Laignelet.

He was thin, fretful, and appeared hypochondriac ; intellect dull ; when questioned he answered in monosyllables, and seemed a very idiot. No fever.

He has had aphonia for eighteen months, no other symptom that he complained of, and it was evident that he had been brought to the hospital by his parents, in order to rid themselves of the trouble of keeping him. We learned that he had been idiotic twice, and that he had recently fallen into his present state of prostration after an attack of fever.

He remained bed-ridden for three weeks, without wishing to rise, without speaking a word, without eating, and finally died of starvation.

At the autopsy the brain offered no alteration ; the intestines were shrunk and rather inflamed.

The respiratory apparatus chiefly attracted our attention ; at the summit of the left lung there was an enormous tubercular excavation which could have contained the fist—its walls were chiefly furnished with a soft membrane, analogous to the mucous tissue ; at points a semi-cartilaginous consistence prevailed ; the surrounding pulmonary tissue was of a blackish gray, and presented some tubercles that were not softened. At the summit of the other lung there were also a few crude tubercles.

The larynx, detached with care, offered the following alterations :

The vessels at the base of the tongue were much injected, and even dilated, so that all this region presented a diffused rose colour, beneath which were large red, vascular arborisations. The same kind of injection was observed in the mucous membrane of the top and sides of the epiglottis, as well as in the excavations between the external face of the aryteno-epiglottic ligaments, and the inner face of the thyroid cartilage, but it became paler as it approached the under side of the epiglottis, and the inner surface of the larynx.

The colour was blood red, and so uniform that it hid the subjacent arborisations. *Within the larynx*, the pale injections were more marked, and more arborescent about the ventricles and vocal cords than at any other part of the cavity. The mucous membrane was covered with a pale rose coloured mucus ; this membrane was decidedly thickened, particularly in the larynx, and the alteration was more marked on the vocal cords and ventricles than in their neighbourhood.

Nothing unnatural was observed in the upper opening of the larynx nor in the epiglottis.

The superior vocal cords were much swollen, especially the left, the swelling reached to the base of the epiglottis, nor was it mere enlargement ; there were mamillary protuberances, and distinct, but small ulcerations, as large as a pin's head ; and at the back of the superior vocal cords they were interrupted by a deep ulceration as large as a cherry-stone. On the right side the ulceration had a true cicatrix, which was irregular, whitish, hard, and mammelliform. On the left side the ulcer was deeper and circumscribed by a black-

ish tissue, and communicated with a sort of excavation, the black bottom of which was formed by the posterior face of the ossified thyroid cartilage which had begun to be necrosed.

The inferior ligaments of the glottis were less ulcerated than the superior; still the left one seemed divided for the most of its length by a longitudinal and superficial ulceration, the bottom of which was cicatrised.

The ventricles of the larynx were tumefied, their capacity was slightly diminished by the swelling of the ligaments above and below. A blackish tint was observed on each side of the inner face of the larynx, below the vocal cords, and opposite the cricoid cartilage, it appeared to belong to the deep seated parts, and to be seen through the transparent mucous membrane. The exterior of the larynx offered no alteration whatever.

In this case we see an aphonia that lasted eight months, and a serious alteration of all the tissues of the larynx. These disturbances evidently followed the softening of the pulmonary tubercles, which could be seen in the large cavern at the summit of the left lung. The sort of mucous membrane that lined this cavity, showed that the softening had long been effected.

The brain presented nothing remarkable, and we are forced to conclude that death was chiefly induced by the organic lesion of the larynx, at first produced by the matter of the softened pulmonary tubercles, and afterwards continuing, although the cavities seemed disposed to heal.

Possibly the lesion of the larynx in its turn contributed to produce the crude tubercles that were observed in the lungs at the moment of death. May not the laryngeal phthisis have been successively effect and cause?

OBSERVATION XXII.¹

Feeble constitution, with congenital predisposition to phthisis.—Frequent recurrence of catarrhs, generally neglected.—Hoarseness; increasing difficulty of respiration, threatening asphyxia.—Progress slow at first, afterwards rapid.—Effects of medical agents at first doubtful, afterwards imperceptible.—Tracheotomy.—Complete recovery from the operation.—Threatened tubercle of the lung.—Left the hospital.—Death from acute phthisis three months after the operation.—Pathological anatomy of the larynx and trachea.

Joseph Morin entered the hospital on the 24th of June, 1835; he was thirty-years old,—a turner,—born at St. Senas,—generally resided at Ivry. In consequence of his delicate health, and feeble, lymphatic constitution, he could not give us a distinct account of the commencement of his disease, although he related what had happened for the last eighteen months. During this period he had been subject to frequent colds, with pains in the throat, and hoarse-

¹ Communicated by M. Fournet.

ness. Three months before he entered the Hôtel-Dieu, having one of his attacks, he had applied leeches to his throat. It also appeared that his mother and one of his brothers or sisters had died of phthisis; he had seemed better than usual, and was taking iodine by the advice of a country physician.

On the 24th of June, the day of entrance, he was feeble, rather pale, somewhat emaciated; voice hoarse and broken, with a sense of pain or rather obstruction in the throat, and in the region of the larynx, to which he often put his hands; expectoration rather scarce, viscous, and thick, after fits of coughing and stifling, which were at first rare and slight, but finally acquired increased frequency and intensity:—while they lasted, the respiration was hurried, orthopnœal, sonorous, sometimes rather hissing, the face was anxious, and the features contracted; at other times the patient was calm and the respiration only a little sonorous and accelerated. The exploration of the chest gave little result; the sound was good, both right and left, and an obscure respiration, neither expanded nor vesicular, was perceived at the summits of the lungs, especially of the left, and no abnormal sound was observed, except a slight indistinct crepitus, which towards July became more distinct and persistent. There was an occasional, irregular, febrile condition, with some dryness of the skin. For the first fortnight, gargles, emollient cataplasms to the neck, the frequent application of a few leeches to the lateral regions of the larynx, pediluvia, and a mild diet, were the only means resorted to. At first they were uncertain, and finally lost all influence upon the disease, which became worse and worse.

On the 8th of July the voice was lower, hoarser, and more obstructed, and the respiration more difficult, laryngeal and hissing. These symptoms increased with astonishing rapidity. The patient suffered continual orthopnœa, and occasional fits threatening suffocation: which were only relieved by the expulsion of a portion of dense viscous mucus. Since the beginning of July, the larynx had been rubbed with the unguent of Autenrieth,—a good many pustules appeared, which provoked a sharp smarting, but produced no melioration of the dyspnœa. Leeches were applied to the sides of the larynx on the 10th and 11th, but without any benefit.

On the evening of the 11th, wishing to postpone tracheotomy by relieving the threatened asphyxia, I applied a blister to the front part of the neck. It operated finely, though the patient scarcely felt the pain; but on the next day he had more orthopnœa, and in the evening his face was pale, ashen, and of a violet tint about the mucous orifices; the tongue was pale violet. The coldness of the extremities, the clammy sweat on the whole body, which communicated the sensation of cadaveric coldness to the face and chest, all announced a speedy dissolution. With a faint and broken cry he demanded the operation. I practised it immediately.

It afforded relief; and after the usual accidents, respiration was

accomplished through the canula, and convalescence was rapidly established.

From the 3d to the 9th of August, the patient continued in a comfortable condition, occasionally interrupted by fever, malaise, and debility; about the end of this time, he fell into a state of ennui and nostalgia, which caused a constant desire to return home. On the 19th of August, yielding to his demands, we let him go; as he could now wait upon himself and attend to the canula. When he parted from us his words were rather higher, and better pronounced than they had been. By auscultation, we perceived at the anterior summit of the left lung, a slight crepitant rhoncus, but only on strong inspirations; the resonance of this side of the chest was perfectly good; the obscurity, and incomplete pulmonary expansion, hitherto observed, still continued.

Morin went to live at Ivry, where he seemed to improve rapidly at first; but in spite of his care, the good regimen to which he submitted, and the great healthfulness of the place, the same general fever and restlessness, observed at l'Hôtel-Dieu, returned, and soon assumed the hectic character. Emaciation, progressive debility, and an abundant colliquative diarrhœa, followed; and after escaping the dangers of a serious operation, this unfortunate man died towards the end of September with the rapid progress of an acute phthisis. To the last he breathed through the canula without experiencing any difficulty.

The physician who attended him at Ivry, when he opened the body, found great tuberculisation of the summits of the lungs, especially the left. He had the goodness to bring us the larynx and trachea, which I showed to M. Trousseau; and after examining it, we had it drawn by M. Chazal.

The os hyoides and the thyro-hyoid membrane were not altered. The tissues that covered the anterior part of the thyroid cartilage, preserved their colour and natural elasticity. But the cellular tissue on the lateral parts of this cartilage was rather dense; and the muscular fibres of this region, both the thyro-hyoids and the inferior constrictors of the pharynx, were brown or blackish, and slightly softened. The space comprised between the inferior border of the cricoid cartilage, and the first ring of the trachea, was occupied by a prominent, irregular tumour, formed of the scirrhus induration of the soft parts of this region. The cellular tissue was whitish, and of a semi-lardaceous consistence, while the brown muscular substance was confounded with it.

This induration and swelling extended through all the upper part of the trachea, especially around the wound of this organ; but it decreased as it left the larynx, so that the cellulo-fibrous tissue that surrounds the trachea was healthy in its two lower thirds.

The opening made by the operation remained gaping; its borders projected forward, and were plaited or crimped by the projection of the cartilaginous rings that had been divided, and which

were not covered by any membrane of cicatrisation—the intervening tissue was somewhat thickened.

The trachea was dilated in its antero-posterior diameter at the wound by the separation of the rings, and at the same point it was narrowed in its lateral diameter; but, below this, it was much flattened from front to rear, and the transverse diameter was much increased.

Blackish, indurated bronchial ganglia, surrounded the extremity of the trachea at its bifurcation.

The epiglottis was permanently erect, and curved like a spout. The swelling of the aryteno-epiglottic ligaments was such that the superior opening of the larynx was reduced to the following dimensions,—transversely, four and a half lines; from front to rear, four lines. The two enormous tumours that resulted from this swelling, completely filled the spaces between the postero-lateral portions of the thyroid cartilage and the posterior opening of the larynx; embracing the arytenoid cartilages and adjacent parts,—they extended to the borders of the epiglottis, and even diminished, by their bulk, the antero-posterior diameter of the œsophagus. There was less swelling on the left than on the right side; its character was œdematous; but the deeper and more central parts were somewhat indurated.

The postero-inferior (*little*) horns of the thyroid cartilage were naked, and projecting in the midst of the ulcerated, grayish, indurated, and divided soft parts that surrounded them. This part of the cartilage, for the extent of seven lines, was hard, ossified, and blackish; in a word, necrosed.

From this point to the top of the trachea, there was a large rounded excavation, nine lines in diameter, the borders formed of degenerated tissues, of a grayish black; at the bottom we saw the whole of the posterior part of the cricoid cartilage, naked, ossified, and converted into a blackish rough necrosis, one part of which was already isolated by the effort at elimination; it was contained in a kind of excavation, with solid, but not bony walls, and was a true sequestrum.

The posterior membrane of the trachea, as well as the cellulo-fibrous external tissue, was much indurated, and three lines thick; the muscular coat constituted the greatest part of the thickening, and presented bundles of fibres, separated by whitish bands, that were lost in the submucous cellular tissue, or in the fibrous substance externally,—they were composed of indurated internuscular cellular tissue.

The tracheal glands were increased in size and indurated; at the upper part of the organ, where the alteration was greatest, they were even confounded with the induration of the tissues.

All the inner part of the larynx, above the vocal cords, was swelled, and occupied by extensive but superficial ulcerations, giving the part a reticulated aspect. They only occupied the thickness of the mucous membrane. Anteriorly, the vocal cords were

swollen so as to reduce the ventricles to two little dimples, but the posterior half of the cords and ventricles was obliterated by a large ulceration, occupying all the lower third of the aryteno-epiglottic ligaments, and extending to the inferior border of the cricoid cartilage, being sixteen lines in its vertical and thirteen in its transverse diameters. The bottom of this deep, irregular, ulcerated surface, presented at its upper part some shreds of blackish and hardened tissue; below, there was a large excavation, in which were seen necrosed fragments of the cricoid cartilage. To the right, it was not so deep, and seemed only formed by the decomposition of the soft parts around the ossified and necrosed cartilage. The sequestrum was found to the left of this excavation, where the walls were shining, resistant, and cartilaginous in their characters.

Below the anterior part of the superior vocal cords, the mucous membrane was covered with patches of little superficial ulcerations.

Similar alterations were also observed at the upper part of the trachea, around the wound of the operation.

OBSERVATION XXII. bis.

Frequent catarrhs.—Aphonia.—Inspiration of alum.—Sulphuretted draughts.—Melioration.—Return of the symptoms.—Touching the throat with nitrate of silver, no beneficial results.—Rational signs of pulmonary phthisis.

Madame M—— was twenty-nine years old. Her mother had been a victim to the cholera, and her father died, at forty, with catarrh. She has not nursed any of her six children, two of whom died young; one of the others, five years of age, is scrofulous; and two little girls, one three years and the other eleven months old, are rachitic.

The patient has always been subject to colds in the winter. In the month of July, 1835, she took a more violent and more obstinate cold than she had before experienced, and spat blood four or five times, which had not before happened.

On the 26th of August, she was in the following state:—The menstrual discharge had been suspended for three months; fatiguing cough, especially at night; almost deprived of sleep; viscid, opaque sputa, adhering to the vessel; dulness under both clavicles, especially the right.

Respiration not mixed with rhoncus, but the expiratory murmur much stronger than the inspiratory.

Considerable dyspnœa; extreme debility; general pallor.

At the same time that the cough began there was hoarseness, which, within a fortnight, has amounted to complete aphonia; still there is no pain in the larynx, nor difficulty of deglutition. Nothing observed on examining the throat.

Pulse eighty-five. Scarcely any appetite, but digestion good.

Prescription.—Infusion of pectoral flowers; night and morning a pill of a grain of powder of digitalis, to be progressively increased to twelve grains a day.

10th of September. The cough is diminished; the digitalis caused some nausea, and dazzling of the eyes; the urine is more abundant; the general health and aphonia remain the same.

The dose of digitalis was diminished two grains per day.

19th. Some melioration, no nausea, urine abundant; pulse seventy; aphonia continues complete.

Prescription. Inspirations three times a day of the following powder:—

℞. Acet. plumb. crystal. p. i.
Pulv. sacch. cryst. p. vii. M.

Stop the digitalis, which is too depressing.

21st. She complains that the powder caused long and fatiguing fits of coughing. We observed that she had used it too freely, and diminished the quantity one-third, after which there were only a few efforts at coughing which soon ceased; the pulse is sixty; she feels pretty well, though weak; she has always perspired freely; her voice has returned a little; she makes herself heard, and emits the sound with some force.

Draught with half a grain of opium: to drink through the day four coffeecupfuls of the following solution:—

℞. Potass. sulphat. gr. xij.
Aqua destillat. fʒ. iv. M.

Each dose to be mixed with half a glass of milk and water.

23d September. Marked melioration; the voice has more resonance, expectoration easy, not much cough, appetite improved. She grows stronger.

Same treatment.

26th. The patient is gaining strength; she sits up part of the day; she sleeps well; the appetite improves; the expectoration preserves its characters; the night sweats continue; the voice is more sonorous and stronger than at our last visit.

29th. She says she feels stronger; her voice is still a little cracked, but nearly natural; she has continued the saturnine inspirations without interruption.

Same prescription.

3d of October. The improvement continues; she sustains her strength; the appetite improves; the cough is less violent and less fatiguing, but she had a considerable hæmoptysis this morning. The night sweats have not ceased.

The same prescription.

8th. Another hæmoptysis, but milder; the same state of progressive melioration; auscultation gives the pure respiratory murmur, but expiration is louder than inspiration; the voice remains as before.

The same prescription, except the inspirations.

11th, 14th, and 17th. Same state, strength increasing, night sweats diminishing, the sputa are less abundant, and more mucous.

Same prescription.

20th. The patient went out yesterday; she feels better; the voice is more harsh.

23d. Some streaks of blood in the sputa; the voice is still harsher; all the functions are well performed; the cough grows less frequent and less fatiguing.

Same prescription.

27th. The aphonia is almost as great as at our first visit.

Same prescription.

30th. Same state; same prescription.

5th of November. More night sweats; expectoration easy; the sputa are more mucous, and less abundant; some fits of coughing which are rather fatiguing; slight fever. She has been out for some days. Considerable oppression, but she can go up stairs; digestion easy; appetite as *good as in health*; almost complete aphonia. We touched the larynx with a solution of one ounce of alum to a pound of water.

The patient said she had been advised to use for several days inhalations of an infusion of elder, which seemed rather to increase than diminish the aphonia.

8th. The same hoarseness and fatiguing cough; night sweats have returned for two days; she complains of their insipid and nauseous odour. The throat was touched with a solution of alum.

Same prescription; draught with half a grain of extract of opium.

12th. Complete aphonia; same general state. The throat was touched with a solution of one part of nitrate of silver and four parts of water.

15th. There was an abundant hæmoptysis yesterday; less night sweats. The nitrate of silver has effected nothing; it is to be renewed.

20th. No change since the 15th. The touching with the solution to be discontinued.

23d. Same state. We applied a cautery to the left arm; continue the solution of the sulphate of potash, and the draught with half a grain of opium.

15th of January, 1836. We had ceased visiting the patient for two months, during which time she had been frequently better and worse. During the last month, the night sweats have recurred with renewed intensity.

The oppression is considerable; the cough fatiguing; expectoration easy, streaked with blood; the pulse small, feeble, frequent, with decided exacerbations in the evening.

We thought we heard gurgling in the summit of the right lung; still, she is full of hope, and has sufficient strength to attend to her daily occupation. The appetite, although diminished, is still pretty

good; the food is well digested, and her voice is somewhat improved.

Prescription. Draught of sulphuret of potassa four grains, water three ounces. In the evening, a julep, with half a grain of opium.

February 1st. Nearly the same state, but the patient has had, during the past week, a dysentery, with violent colic. Hectic fever cannot be mistaken. The appetite diminishes from day to day, the strength fails, and it is easy to prognosticate the termination of this terrible assemblage of symptoms.

It is difficult to assign a place to the laryngeal phthisis, in the order of development. The alteration of the lungs was observed at the same time with that of the larynx, and the patient said the hoarseness and catarrh came simultaneously. At any rate, we have seen that the voice was nearly restored, while the pulmonary disease continued. It seemed checked in its progress, the appetite and strength returned, the night sweats diminished, and the pulse regained its natural standard.

Suddenly the hoarseness returned; it could not be modified by the means employed, and the pulmonary affection assumed renewed activity.

It is easy to see the influence exerted by the affection of the larynx on that of the lungs; which proves, at least, that if the tubercular diathesis had produced primarily a disease of the larynx, it could, in turn, impress pulmonary tubercles with new activity; and, moreover, that we should not neglect treatment of the larynx, even when we attribute the disease to the lungs.

CHAPTER V.

SYMPTOMS.

AFTER describing, in a general manner, the symptoms of laryngeal phthisis, we shall specify the forms and peculiarities of each species; and then endeavour to point out the relations that exist between especial lesions of the larynx and particular series of symptoms. And, in review, we shall mention the diseases that might be confounded with laryngeal phthisis, and show how they differ from it.

General symptoms of laryngeal phthisis.—During the first period of the disease, local symptoms alone claim the physician's attention. The general symptoms are rarely developed, except when acute diseases of the larynx give rise to laryngeal phthisis, or when that assumes a threatening aspect. It is, therefore, the local symptoms that should first attract our whole attention.

A. *Alteration in the quality (timbre) of the voice.*—This is one of the first symptoms that attract attention. At first, it is often a simple want of power; oftener a decided hoarseness. Sometimes continual, at others, recurring only when the larynx has been fatigued, or when the patients have been exposed to a change of temperature.

It is an important fact, that the transition to a colder atmosphere is less prejudicial than the change from cold to warm. This singular result has been repeatedly observed in our patients, and we confess we have been much surprised at it. The voice, also, becomes hoarser, in proportion to the time the patient has been up, so that, on the morning visit, when the patient has just awoke, we have observed the voice much clearer than in the evening. This is probably owing to the larynx having gained some repose during sleep, and becoming fatigued during the day.

Another observation, which seems to have escaped writers, is, that if there be a good appetite for food, the hoarseness is generally very decided, and that it disappears, more or less completely after the meal, but soon returns to the same point as before.

It is not a useless exercise to examine into these minor details, because we may be often deceived in our diagnosis of the state of the larynx, if we are ignorant of these singular changes, and of the causes which produce them.

The menstrual period, also, affects the hoarseness, which is generally greatest at the approach, or passing off of this discharge. Venereal indulgence, also, increases it considerably.

The hoarseness is intermittent in the first stage, but soon becomes continual, and may remain so until the close of the disease, though extinction of the voice often supervenes in the second stage.

It is difficult to describe the approach and symptoms of the hoarseness; though a practised ear recognises some sounds which correspond to peculiar forms of alterations in the larynx. Thus, there are some kinds which convey to the ear a mucous and broken sound, but which show that the column of air has not a free passage; this is what we have called the *mucous* hoarseness: it is heard in simple catarrhs, and when constant, commonly only indicates catarrhal inflammation.

In other cases, the voice is hoarse, uneven, and rough; this we call *stridulous*: it is a bad symptom, as it almost always corresponds to an ulceration, or to vegetations in the larynx.

The aphonia, by which we mean the complete loss of the faculty of speech, comes on in the second stage of the disease, and is a serious symptom, but subordinate to many conditions which modify it.

The aphonia, which comes on suddenly, with an acute disease of the larynx, and continues when the disease has passed into the chronic form, is not nearly so alarming as that which advances progressively.

That which succeeds the *mucous* hoarseness is not so bad as that which follows the *stridulous*, for obvious reasons.

In some patients, the aphonia presents curious varieties. The voice may be completely extinguished in the evening, and merely hoarse in the morning, at the moment when the patient gets up, and immediately after eating. This form may indicate a superficial organic lesion, or simply a catarrhal affection.

The inequality of the voice is a more common phenomenon in laryngeal phthisis than has been commonly supposed, or than the patients themselves believe. When the larynx is diseased, the volume of sound is instinctively diminished, and the emission of air is generally proportioned to the intensity of phonation. But, patients who, in spite of the alteration, wish to give the original force to their voice, find that the want of calibre and strength of the vocal instrument gives rise to unexpected and discordant sounds. We have often noticed this in singers and advocates. Colonel B., who enjoyed a high reputation in the army, furnishes a remarkable instance.

He had a chronic affection of the larynx of two years' standing. In ordinary conversation, his voice offered the *stridulous* hoarseness in a slight degree, but it was perfectly even, and, except its force, it was easily modified for animated discourse. But, when he commanded his regiment, there were such uneven and singular bursts, that nothing short of the greatest respect prevented the officers and soldiers from laughing. The finals, for which the vocal tube had to be largely opened, could not be pronounced without change; thus, the word *lance* was never uttered without the sound being converted into a broken cry.

This has some similarity to what is often observed in youth at the age of puberty; differing in this, that the latter are not hoarse, but have two different *timbres*, and a discordance of the voice.

B. Cough.—Does not differ from that observed in most diseases of the thorax: it is generally frequent, and by spells. The sound always corresponds to that of the voice. When there is aphonia, or the *stridulous hoarseness*, it has a peculiar sound, which it is important to have well described.

We have called it *eructant*, because, when the patient coughs, he seems to make a suppressed eructation. This character is always diagnostic of a serious alteration of the larynx.

In a common cough, we may observe that the air is expelled by the action of the diaphragm and expiratory muscles, while it is retained, on the contrary, by the contraction of the glottis; the expulsive effort finally overcomes the resistance, and drives the air through the larynx with a sound which we call "cough."

Now, when the sound, instead of being clear and short, is prolonged and *gulping*, it is because the glottis is unable to move freely, or because deep ulcerations prevent it from closing; which explains why the eructant cough is so bad a symptom.

The difference in frequency is altogether inexplicable. Some are tormented by an incessant cough, so obstinate that they cannot

enjoy a moment's rest, and their food is rejected by the contraction of the expiratory muscles; others, whose autopsy presents the same lesions, have scarcely coughed, and succumbed only under the increasing swelling of the mucous membrane of the larynx, and the consequent asphyxia. The cough is generally calmed by food and drinks during the first stage; but, in the second, aliments pass partially into the larynx, and cause convulsive fits of cough, which nothing will relieve. The frequency of the cough is not nearly so unfavourable a symptom as its hoarseness, and the change in the volume of the voice. Some persons have an obstinate cough for years, while their lungs remain free, and there is no alteration in the larynx: one of our patients, Baron Trémont, is in this situation. He coughs in the most fatiguing manner; the most energetic medicines afford him no relief; but his voice remains clear, and nothing indicates tubercles of the lungs, or ulceration of the larynx.

C. Signs furnished by the expectoration.—The expectoration in simple laryngeal phthisis furnishes negative rather than positive signs. It is commonly purely mucous, transparent, and not very tenacious; sometimes very abundant, and a simple mucous secretion (*phlegmorrhagie*;) sometimes less copious, when the matter is more thickened.

When there is an ulceration, the expectoration, without losing the characters already described, offers some peculiarities. Little puriform masses, often mixed with streaks of blood, and even quite bloody, are expectorated, without effort, rather by an attempt to clear the throat than by a cough. We shall hereafter see the diagnostic value of the abundance of puriform expectoration.

D. Pain.—In more than half the cases of laryngeal phthisis there is no pain from the beginning to the end of the attack. It is even remarkable, that they who complained a little at the commencement of the disease, when the phlegmasia was acute, did not suffer at all when the mucous membrane and the cartilages of the larynx were nearly destroyed by ulceration or necrosis.

In a few, there is some pain in the larynx, especially at the origin of the trachea; it is rather a sensation of smarting, which we have never found very distressing to the patients. On the contrary, almost all suffer acutely when they swallow, and patients tell us they feel no pain in speaking or breathing, but when they swallow, and therefore their disease must be in the pharynx only. An examination of the pharynx shows nothing which could explain the symptoms; and if we have an opportunity of making autopsic examinations of the organs of voice, we find considerable organic alterations. How, then, shall we explain this want of correspondence between the anatomical lesions and the symptoms? We think it may be easily done. What parts of the larynx are ordinarily most affected? By turning to the chapter on pathological anatomy, it will be seen that, in ulceration, caries, or necrosis, the mucous

membrane, which covers the epiglottis, the aryteno-epiglottidean ligaments, and the arytenoid cartilages, is almost always the seat of inflammatory engorgement. Now, this forms the anterior part of the pharynx, and no effort of deglutition can be made without the mass of food being pressed against these inflamed and often ulcerated tissues.

When, on the contrary, the front part of the larynx is touched through the skin, the inflamed mucous membrane is protected by the hyoid bone and thyroid cartilage, and, consequently, does not receive impressions of pain, unless we indent the cartilages, or move them considerably: add to this the fact, that the membrane at the upper opening of the larynx is endued with extreme sensibility, while that lining the organ has very little:—we have satisfied ourselves of this by experiments made when we have been obliged to perform tracheotomy.

E. *Signs obtained by inspection.*—By opening the patient's mouth widely, and depressing the tongue with the handle of a crooked spoon, so as to bring the base of the organ well forward, the veil of the palate, the uvula, the tonsils, and the bottom of the pharynx are brought into view. It is important to ascertain the condition of these parts, especially when we have syphilitic laryngeal phthisis. The state of the uvula, also, deserves especial attention, because the procidence of this organ may sometimes cause serious inflammatory symptoms in the larynx.

But the exploration of the epiglottis is of extreme importance, as we have before remarked: although this organ belongs to the tongue, its pathological relations require it to be considered as an appendix to the larynx. Pathological anatomy shows us, indeed, that the larynx is rarely much diseased, without the epiglottis partaking in the affection.

But there are few patients in whom we can see the epiglottis: we have met but two, in whom the throat and the tongue were so formed that we could see the whole of its upper surface. By making the patient utter a cry during the examination, the epiglottis may be seen starting forward at every expiration. In these two patients, whose disease was not far advanced, the mucous membrane was of a cherry red, and decidedly thickened. It may be inferred that the aryteno-epiglottic ligaments and the lining of the larynx were in the same condition.

It would, doubtless, be very important to be enabled to examine the larynx by means analogous to those furnished by the speculum. Some years ago we endeavoured to construct a *speculum laryngis*. M. Selligie, a very ingenious mechanic, himself a sufferer from laryngeal phthisis, of which he has been completely cured, constructed for his attending physician, a speculum formed of two tubes, one of which conveyed light to the part, while the other returned the image of the glottis, reflected in a mirror at the guttural extremity of the instrument. M. Sanson, cutler, made us a speculum on the principle of that just described. This instrument is

of difficult application, and there is not one patient in ten who can bear its introduction. Indeed, its volume fills the space comprised between the free border of the veil of the palate and the upper surface of the tongue. When placed in the mouth, it provokes such uncontrollable starts, (*haut le corps*), that it is necessary to remove it immediately: if it touch the bottom of the gullet, which is almost sure to happen, the pharynx contracts convulsively, and with such energy as to force the instrument into the mouth.

In the most favourable case, when the instrument can be retained in the isthmus of the gullet, the inevitable constriction of the pharynx still prevents our seeing the deeply-seated parts.

There is another difficulty, which is enough in itself, to prevent our using this instrument. The epiglottis covers the upper part of the larynx so completely as to prevent the possibility of obtaining a reflection of the parts in a mirror; and further, the light introduced by the instrument must fall upon the upper or lingual face of the epiglottis, and, consequently, casts its shadow precisely on the larynx, and thus hides it from our view. Bennati was, therefore, mistaken, when he pretended to have seen the glottis with the speculum of Selligue; he generally saw only the lingual surface of the epiglottis, and very rarely the superior opening of the larynx, and that only when the accidental elevation of the epiglottis permitted.

The glottis is so deeply and peculiarly situated that it is impossible to explore it with the speculum even in the dead subject, much less upon the living, especially when we consider the convulsive effort that attends its introduction, even in those who have been most habituated to it.

We have never observed swelling of the anterior region of the neck in simple laryngeal phthisis; this is owing to the mucous membrane being separated from the subcutaneous cellular tissue by the whole thickness of the cartilages. It is remarkable that even when there is considerable necrosis or caries of the cartilages, there is seldom any external tumefaction which would lead us to suspect such serious disorders.

We have only once seen a tumour point between the cricoid and thyroid cartilages; this was almost insensible at first, but coincided with decided laryngeal phthisis. It was necessary to perform tracheotomy to prevent asphyxia, and we afterwards saw the tumour developed as an enormous cancer. Obs. XVIII.

F. *Signs obtained by touch*.—In pressing the larynx a crepitation may sometimes be perceived, which has been mentioned by some authors, especially by M. Laignelet, as a sign of laryngeal phthisis.

This sign at first deceived us, thinking it was produced by the rubbing of the necrosed portions against one another. But experience has taught us that it is most frequently found when the larynx is perfectly healthy; hence it loses its value as a diagnostic. Still it should not be neglected, but we must pay great attention to dis-

tinguish whether the crepitation be produced by the friction of the cartilages against the vertebral column, or whether it result from the grating of portions of cartilage that have been separated from each other by caries or necrosis. In the latter case the noise would probably be drier, and might be produced by squeezing the larynx; while in the former, it is never hard, except when the whole organ is moved. We confess we have never distinctly heard the crepitation resulting from the pathological state of the larynx.

As for touching by the mouth, which is advised in almost all works on œdematous laryngeal angina, we may observe, that the exploration of the glottis is physically impossible, as the finger cannot be introduced into the larynx. The examination must be confined to the epiglottis and upper part of the larynx.

But this exploration is attended with more difficulty than is supposed by those who theoretically recommend it without having practised it on many subjects. It is far from being so simple as touching the neck of the uterus; as soon as the finger has reached the base of the tongue and has merely touched the epiglottis, there is so energetic and general a spasm induced, that the finger can remain in contact but a second or two, so that we cannot thus obtain much information, and can only detect great alterations, such as vegetations or tumours. We cannot by this means ascertain the existence of ulceration in the aryteno-epiglottic ligaments;—at least, we have never been able to do it, although accustomed to this mode of examination.

We read with astonishment what some authors tell us in their writings upon œdematous laryngeal angina; when they say it is very easy to recognise this serious disease by the touch. We esteem it a very difficult, if not impossible diagnostic means, for the reasons already stated.

Touch is, therefore, rarely applicable in our diagnosis of diseases of the larynx.

G. Signs furnished by respiration.—These are among the most important next to the signs furnished by the voice. In the first period of laryngeal phthisis, the respiration is not generally disturbed, except under peculiar circumstances, and when the patient takes violent exercise, in which case the inspiratory sound is a little braying; nothing of the kind is observed in expiration. If by chance in the course or at the commencement of the first period there should suddenly occur an increase of laryngeal inflammation, then symptoms of acute croup will be manifested; but this is an exceptional case, and in proportion to the progress of the disease will be the increase of oppression, which may be owing to two causes.

If the disease of the larynx have induced consumption by the means we shall explain, or if there exist simultaneously pulmonary tubercles,—a powerful cause of laryngeal phthisis, the patient will have shortness of breath and panting on the least exercise, and sometimes even when in a state of repose. In this case

the oppression does not differ from that observed in cases of debility and other forms of phtisis. But there is another important form of dyspnœa,—that which accompanies narrowing of the larynx. This has peculiar characters, and we shall endeavour to describe its form and course.

When the disease has been of long standing, and the obstruction begins to attain considerable age, the patients who had suffered mere panting (*anhelation*) accompanying their debility, begin to experience what they call fits of asthma; at first, these occur in the latter part of the night, sometimes they are awakened four or five nights successively by paroxysms which increase in force. During the day they are better, but have an unusual difficulty of respiration, especially when they take violent exercise, or ascend a stair.

After a while they cannot lie in bed, but remain seated and propped up with pillows. They have similar attacks during the day, and from this time the inspiration is hissing and respiration is prolonged and braying.

In a few days, such violent paroxysms come on, that the sense of impending suffocation causes the patient the deepest anxiety; the fits pass off, leaving continued orthopnœa. More violent and more frequent paroxysms follow, until the patient finally perishes from suffocation.

These fits are truly frightful; with livid face, open mouth, expanded nostrils, suffused and projecting eyes, and streaming with perspiration, the patient rapidly paces his chamber, and occasionally lays hold of objects that he may breathe more easily; sometimes the head is inclined upon the breast, but more frequently reversed; when, at last, overcome with fatigue, he sits down for an instant, soon to get up again. He tears all covering from his head, neck, and chest, and exposes himself eagerly to the cold air at the window, which he throws up with a sort of transport.

Inspiration is hissing, short, and executed by the whole of the inspiratory muscles; but expiration, although less braying, is long, and as laborious as inspiration. Expiration is generally passive, but in these cases it is quite as active as inspiration.

At last the patient falls into profound depression; respiration is more frequent, shorter, and apparently easier; the breath is not warm; the whole body grows cold; the face changes from livid to pale, and is glossy; the eyes grow dim, and death occurs in a sort of calm.

The time from the first fit of orthopnœa until death is generally fifteen to twenty days; the fits begin to recur more than once a day about five days before death. To this, however, there are numerous exceptions. Sometimes a paroxysm occurs in the course of the disease, which proves almost immediately fatal. We will state two cases of this character; the first was noted by M. Marjolin and ourselves; the second by Morgagni.

OBSERVATION XXIII.

Forty-two years of age—Previous good health—First symptoms in the larynx—Sudden attack of suffocative angina—Voice hoarse, almost extinguished—Progressive swelling of the lips of the glottis—Threatened asphyxia—Crude pulmonary tubercles.

Dr. C. of Calais, came to Paris, in the month of October, 1835, to consult M. Marjolin, who asked us to see the case with him.

The patient was 42 years old, and had led a very busy and laborious life; he had always enjoyed good health. In March, 1835, he began to have some dry cough, which became more frequent, but was still unaccompanied with expectoration. There was soon some difficulty of respiration, which did not prevent him from making thirty or forty professional visits every day.

Last August, he was taken *in the street, one morning, with a fit of suffocation, which increased so rapidly that he was unable to proceed.* When bled, he breathed more easily, and was taken home, where he was bled again, and leeches were applied, followed by revulsives.

After fifteen days he was somewhat relieved, and returned to his business. He still had fits of dry, rough, hoarse cough, and shortness of breath. He was soon unable to go up stairs without suffering great inconvenience.

When we saw him there was considerable alteration of the features; he says he has been greatly emaciated since he was taken. Expiration was easy; inspiration laborious and hissing; the cough had precisely the sound of a hoarse eructation (*rot enroué.*)

We made him read; the timbre of his voice was hoarse and rough; when he took breath, after reading a passage, the inspiratory sound seemed distant, and accompanied with a decided hissing.

We carefully examined the lungs, and found manifest dulness at the summit of the left. Bellows' sound on expiration; no pulmonary expansion at this point; some moist ronchus.

There could be no doubt as to the diagnosis; pulmonary tubercles were evidently present, but scarcely any had been softened, as he had no expectoration; and still the larynx was so much diseased that he had been threatened with asphyxia, and the oppression continued to make constant progress.

We merely advised him to use simple means, and in two days he set out for Calais.

A fortnight had barely elapsed, when we heard that he had another attack of suffocation, which resisted the most energetic measures.

We must mention another case (No. 49.) that of M. P. who had been for several months in a state of constant orthopnœa, from which he recovered: though for a long time we thought tracheotomy would be our only resource. The cases of Madame **** (Obs. 49 bis.) and

of Miss Basinet (No. 49 ter.) were of a similar character, and all were attacked with laryngeal angina, presumed to be syphilitic.

The progress and order of these symptoms are the more important, as by them alone the physician can judge of the propriety of an operation.

Indeed he must know what is the usual term of the period of dyspnœa, and he should know exactly what are the signs of approaching dissolution, that he may hold himself in readiness to perform tracheotomy, and not practise it sooner or later than necessary. When on the subject of treatment, we shall specify when and how it should be performed.

Let us now recur to the respiration, and the forms it presents in the last period of the malady.

Bayle and M. Thuillier have particularly insisted, that when the aryteno-epiglottic ligaments were œdematous, inspiration was more difficult than expiration; and they have made this an essential character. We must say, that although aware of the value they attached to this symptom, and seeking it with much care and attention, we have never been able to meet with it.

It is true that there is a decided hissing during the inspiration, and that this is not observed in the expiration; but the same sound may be observed in all cases where the larynx is narrowed, at any part or in any way; because, in the inspiratory effort, the air traverses the larynx with double velocity, as may be readily ascertained by counting the precise period of the two movements, by the second hand of a watch; it follows, that the increased velocity must produce a much louder noise than the gentle and slow expiratory movement. The difficulty is not dependent upon the free border of the œdematous ligaments falling into the larynx during inspiration, and thus diminishing the capacity of the glottis. This ingulfing of the superior border of the larynx is not so easy as has been supposed. Indeed, in inflammatory œdema—and we have shown that this disease is nearly always inflammatory—the consistence of the mucous membrane, and especially of the sub-mucous cellular tissue, is not that of flaccidity, but generally of extreme tension.

In the dead subject, it is true that these œdematous parts are sometimes so flaccid that they quiver, and might be made to obey the pressure of the inspired air; but this is a very rare circumstance, and we have yet to learn that it is any thing more than an effect of decomposition, or that it does not result from the blood of the engorged parts leaving them, and in that way producing the flaccid condition, which did not exist during life. The same phenomenon may be observed in other tissues, which were tumefied and resisting previous to death, but sunken and flaccid afterwards.

We must now turn to the great question of intermissions in the fits, and in the spasms of the bronchia.

Autopsy shows us a fact, which will not explain the symptoms, to wit, incomplete obliteration of the larynx. Careful observers

find that the glottis is never entirely closed, and that there is always a passage for the air. Hence the conclusion has been drawn that there had been a spasm of the bronchia, complicated with the disease of the larynx, which was the final cause of death. This idea appeared the more plausible, because intermissions had been observed in the paroxysms.

In regard to the anatomical fact, cited by the partisans of this idea, we should first say, that the swelling of the mucous membrane, though considerable during life, diminishes after death; and consequently the opening of the glottis at the autopsic examination may be larger than it had really been while the patient lived. But, admitting that the glottis had the same capacity during life, still death was caused by want of sufficient air—if not by *asphyxia*, in the rigorous sense of the term.

It is absurd to suppose that the epiglottis could be completely closed during life, for the occlusion would not bring on death by slow asphyxia, such as we observe in croup and laryngeal phthisis, but it would cause immediate asphyxia in the space of one or two minutes. Hence the passage of air must have been free until a certain point. It is not the same with insufficient respiration. If the glottis have a capacity represented by two, instead of a capacity equal to four, and if, for the proper aeration of the blood, the air should bear a proportion to the natural dimensions of the glottis, is it not evident, that with this diminished capacity, the lungs will receive only half as much air as is necessary for sanguification?

On this hypothesis the venous blood will not be completely arterialised, and the patient will be in the same predicament as the animal upon which Bichat experimented, when the blood flowed from the carotids of a bright vermilion if the trachea was left open, brownish when half closed, and black when the air was excluded: thus, when from any cause the larynx is half closed, the blood assumes the character of that in the animal which did not breathe a sufficient quantity of air, and it must follow that if asphyxia ensue slowly, it is no less a real asphyxia.

It is easy to make analogous experiments on ourselves. Thus, if you breathe through a tube equal in capacity to one of the nostrils, respiration will be found to go on comfortably, and the functions will be well performed. But if you take a quill, respiration will soon become laborious, and at last true orthopnoea and a sense of suffocation will supervene.

Considering the influence exerted by the blood on the nerves and nervous centres, and their effects upon respiration, we may understand all the spasmodic phenomena, and all the nervous symptoms, and we shall comprehend the intermission, as being like that observed in most neuroses; so that we need not have recourse to spasms of the bronchia, which no one has ever seen. They who have attempted to explain asphyxia by spasm, have looked for some anatomical element in these tubes which could account for it. Muscles have been demonstrated, and we have the

high authority of Reisseissen and Cruveilhier, that the bronchia are semi-cartilaginous and semi-muscular.

We admit, that with the aid of the magnifying glass and the finest instruments fibres are found in the bronchia, which in their fascicular arrangements, bear a very close resemblance to membranous muscles, such as those of the intestines. But mere anatomical resemblance is not all that is wanting, especially as it is seated rather in the colour than the texture: it must be a functional resemblance, which our experiments have failed to demonstrate.

If the bronchia were provided with muscles of organic life, they ought to be contractile; and this contractility should be manifested by motion, as it is in all muscles of the same class.

The following experiment seems to show the non-existence of contractile fibres. We have had several horses killed by a sudden blow on the head, and immediately opened their abdomens; then by a large and rapid incision, we detached the diaphragm, and removed the trachea, the lungs, and the heart. With long buttoned scissors we cut the principal divisions of the bronchia, and stimulated them in every way, in order to excite muscular movements. But we have never seen the slightest contraction in any of our various experiments, whilst the heart, the muscles of the life of relation, the intestines, and the bladder, long continued to offer evident signs of this contractility. If it be objected that the bronchial muscular coat is endowed with less energy, and therefore soon loses its function, we answer that in the same animal the muscles which have most energy are the first to lose their contractility; thus, death begins in the muscles of the life of relation, then in the heart, and in the heart, first the left side, then the right ventricle, and last the right auricle. The digestive tube next parts with its vitality, and of this apparatus, the œsophagus before the intestines.

If we study these phenomena in other classes of the vertebrata, we shall find that birds, which seem endowed with the most energetic external life, lose their muscular excitability very rapidly after death; then come the mammalia, which preserve it rather longer; next in order, reptiles, in which it remains a long time after apparent death; and finally, fish,—the heart of an eel has been seen contracting twenty-four and even thirty-six hours after death.

If from the vertebrata we descend to insects, we shall see that some of them preserve their muscularity for an extraordinary length of time; the head of a decapitated beetle may preserve its power of closing its horns forcibly for four, six, or even eight days.

If, then, the muscular coat of the bronchia possessed any contractile property it would not be extinguished in two or three minutes.

Perhaps it will be said we cannot justly estimate the influence of the nervous system, and that the cessation of the cerebro-spinal influence may suffice to abolish contractility immediately. But this objection, which is absurd, may be solved by a direct and pal-

pable fact. The trachea of a horse may easily be exposed for several inches; if it be then cut, lacerated, or stimulated in any way, it is impossible to perceive the least muscular contractility.

In the numerous operations we have performed upon the trachea, we have never perceived any muscular contractions in its fibres; and when we have passed probangs into the bronchia we have never felt the whalebone clasped by the contraction of the bronchia, even when the sponges were soaked with very irritating fluids.

How can we admit the spasm of the bronchia in the face of all these facts? Why should we bend all analogous laws of anatomy and pathology to explain phenomena that are rendered perfectly clear by the partial occlusion of the larynx?

Further, if this orthopnœa were caused by spasm of the bronchia, why does tracheotomy afford instant relief? An examination of the simplest physical laws will show more clearly the slender basis of this theory of spasm.

In the orthopnœa, when the inspiratory effort creates a tendency to vacuum in the thorax, the pressure of the external air is such that the lower part of the sternum is pressed in, and nearly touches the vertebral column. But, we ask, if the air entered the chest freely, what an immense energy there must be in the spasmodic contraction of the bronchia to resist the pressure of the atmosphere? and this in a muscular tissue, in which contractility has never been demonstrated!

This explanation has invaded almost every department of our science. A surgeon experiences a sudden difficulty when introducing the tube of Anel's syringe, and explains it at once by the intervention of spasm, rather than by a simple sanguine congestion, caused by the irritation of the instrument. It might as well be said that the nasal fossæ, those bony canals, endued with a delicate mucous membrane, were affected with spasm, when, without appreciable cause, and without the possibility of the secretion of mucus, and simply by a sudden swelling of the olfactory membrane, stoppage of the head, and impossibility of breathing through the nostrils, suddenly occur.

Again: why should we refer to spasm, when it is so easy to explain the symptoms by the swelling of the mucous membrane? But, it will be asked, why should these singular intermissions occur, if the disease be not nervous, but depend upon a fixed, immovable organic lesion?

We answer, by referring to a law of our organism, a law derived from facts. A cancer is immovable, the pains are intermittent; a calculus remains in the bladder, though the symptoms are not constant. Intestinal inflammation is ever present in dysentery; the colic occurs at long intervals. The product of conception remains in the uterus during parturition, but the pains are intermittent. The collection in a hernial sac constantly strangles the intestine, while the vomiting, the syncopes, and the colics are paroxysmal. There is undoubtedly something nervous in all this;

but, while making this concession, we are far from admitting that it is wholly nervous. The reader will pardon our entering into so long a discussion. It was necessary to have our premises well established; and we have endeavoured to clear up a question that has been long and sharply debated, and which is not yet clearly settled in the minds of some eminent men. We have been unwilling, in this examination, to oppose assertion to assertion, but have endeavoured to confirm our views by experiments which seemed to us conclusive.

Signs furnished by the mode of deglutition.—In some patients attacked with this disease, besides the pain in the act of deglutition, already noticed and explained, we find another serious symptom, to which our attention is naturally directed; it is the impossibility of swallowing liquids or food that is minutely divided, and cannot be formed into an alimentary bolus. Most authors attribute this phenomenon to the destruction of the epiglottis, thinking that this organ did not exactly cover the entrance of the larynx, and that, at the moment the food passed the base of the tongue, it necessarily fell into the air passages. The facts which we have observed have taught us nothing respecting the mechanism of this functional difficulty. They have only proved that the destruction of the epiglottis did not prevent some patients swallowing perfectly; and that others, whose epiglottis was untouched, could not execute any movement of deglutition without letting the food enter the larynx. Examples will be found in the two following cases.

OBSERVATION XXIV.

Detmer, a currier, has been a vigorous man, of quick and passionate character, of a bilious temperament, and was born of parents who died young; his father was destroyed suddenly by a fit of mania, to which he was subject; his mother sank under typhoid fever.

The patient, who is in his fortieth year, has been subject to returns of cold every winter for eight or ten years, sometimes accompanied with pleuritic pain: he was treated for pleurisy three years. During his catarrhal affections, he has had five or six attacks of *sore throat*, which yielded readily to simple means.

In December, 1834, he took his wonted *cold*, which, as usual, harassed him very much, though he never spat blood. This cold was accompanied, from the beginning, with sore throat and an obstinate hoarseness, which increased until June, when the tonsils were touched with burnt alum, and he took eight or ten grains of the extract of hemlock each day. These measures proving inefficacious after a week's trial, they were abandoned after eight days, and the left tonsil was incised. The operation was unsuccessful. Insufflations were made with a powder of nitrate of silver. No benefit was derived from this medication.

22d September, 1835. *Present state*: general emaciation, pallor

of the face and skin. Complete aphonia for four months; acute pain in the throat when he swallows either solid or liquid food. The right tonsil is deeply ulcerated, as is the remnant of the left. The bottom of the gullet is of a livid red. The larynx is not the seat of any pain, except when the finger is placed on the right superior border of the thyroid cartilage, where a little eminence is felt, as large as a pin head, which is sensitive under pressure. The respiration is not hissing, and the air seems to enter the lungs without any hindrance. There is considerable dyspnœa whenever the patient takes a few steps; the cough is frequent and fatiguing, with considerable expectoration: some of the sputa are streaked with pus; others viscid, small, opaque, rounded, and swimming in a sort of mucilage. Thorax resonant throughout; gurgling under the clavicles; pervigilium caused by the cough; night sweats on the face and chest; pulse small, frequent, and weak; appetite irregular; digestive functions good; neither diarrhœa nor constipation; urine natural.

23d September. We recommended the patient to enter the Hôtel Dieu, where he was admitted, and placed under the care of M. Guéneau de Mussy, and he was ordered—Gargle of barley water one pound, honey of roses two ounces, and hydrochloric acid twenty drops; gum water, poppy tea, soups.

28th. Same state, perhaps more debility. Same prescription. (The nails are not curved, or, at least, they have not the curvature peculiar to phthisical patients.)

5th of October. Same state; same prescription.

9th. The patient is growing weaker; his features are altered; the abdomen is tumefied and torpid; there has been constipation for eight days. Death occurred at seven in the evening.

Autopsy thirty-nine hours after death.—The lungs are crowded with tubercles in all their stages; there are several caverns at the summits.

Larynx.—Hypertrophy of the follicles at the base of the tongue; their mucous membrane is the seat of flat, irregular ulcerations, especially towards the base of the epiglottis, where it is eroded and puffy; the free border of the epiglottis is partially destroyed, and irregularly slashed; its tissue is altered towards the upper part, so that little yellow, cheesy fragments may be removed by a scalpel handle. The aryteno-epiglottic folds are tumefied, puffy, and present the fretted aspect of old ulcers. The arytenoid cartilages appear partially destroyed. At the base of the left one there is a little deep ulcer of a blackish aspect, from which ichorous pus may be pressed.

All the laryngeal mucous membrane presents a sombre yellow aspect, and a puffiness analogous to that of the aryteno-epiglottic ligaments; the ventricles of the larynx are almost effaced by this thickening. At the upper part of the entering angle, formed by the two plates of the thyroid cartilage, there is an ulceration which has

destroyed the whole thickness of the mucous membrane and cartilage, and its base, which is the external perichondrium, is much softened at this place. The mucous membrane, that covers the laryngeal face of the epiglottis, is almost entirely destroyed; the superior vocal cords are confounded with the investing mucous membrane, and partially transformed into a lardaceous tissue, which creaks under the knife; the arytenoid cartilages are destroyed in their two upper thirds.

Before dissecting the larynx, we pressed the epiglottis down over the glottis, and found that it covered only about two-thirds of the aperture. This is an important observation; *for, on the very morning of his death, Delmer drank, without manifesting any pain in swallowing.*

This observation is very analogous to one noted by M. Louis, in whom the epiglottis was entirely destroyed; but, in his case, deglutition was difficult, and the patient seldom swallowed drinks without rejecting part by the nose.

We now present the history of a patient whose epiglottis was entire, but who rejected both food and drinks by the nose, and let them fall into his larynx.

OBSERVATION XXV.

General eczema, disappearing under proper treatment.—Pain in the larynx.—Hoarseness, dry cough, abundant expectoration, then dysphagia.—Spontaneous melioration.—Reappearance of the symptoms after a cold.—Emaciation.—Complete aphonia.—Repeated fits of dyspnœa.—Tracheotomy.—Death soon after the operation.—Lungs tuberculous.—Ulceration of the larynx and trachea.—Ossification of the cartilages.

M. L., of Dunkirk, aged fifty years, came to Paris, in August, 1835, to consult M. Marjolin. He had lost his voice: a serious affection of the larynx was prognosticated. We were called in, and continued to treat the case conjointly; and, until his death, on the 9th of December, 1835, he submitted to the medications we had prescribed.

M. L. had been captain in the marine, then in the merchant service; he rarely took cold; and neither he nor any of his family had ever experienced symptoms of thoracic disease. He has had three children, neither of whom have been scrofulous or tuberculous.

In the month of August, 1835, shortly after establishing himself at Dunkirk, M. L. had an eruption over his whole body, which, from his description, we suppose to have been eczematous. At first it was confined to the face, and was unsuccessfully treated during a year; finally, in 1826, it disappeared, but a pain in the throat immediately came on, with a sense of oppression, and for some time the patient had a fetid expectoration of bad character. Two blisters, applied to the arms, relieved all the symptoms. In

1828, the disease of the skin yielded, and was only observed to return at distant intervals, and with very mild characters. In 1829 and 1830 he was bled; in 1831 one of the blisters was laid aside. Every thing went on well until July, 1833; this year he had not been bled.

M. L., without any appreciable cause, now began to experience pain in the region of the larynx, with a dry cough. Towards the end of the year, the voice became hoarse, and was accompanied with tenacious expectoration, which was only expelled by considerable effort. From the month of December, 1833, until May, 1834, the patient was confined to his room, and the pain in the larynx was very acute, especially in efforts at deglutition. He could only swallow liquids, and that with great pain; some drops always entered the larynx, and caused an extremely fatiguing cough. In the months of May and June, 1834, the cough and hoarseness increased, and finally there was complete aphonia. But in July, the symptoms were completely removed, the appetite returned, deglutition became easy, the cough ceased almost entirely, the strength returned, and the voice was restored, though hoarse and weak. This state continued until August 1835, when M. L. took a severe cold after exposure. Deglutition immediately became difficult, the cough obstinate and paroxysmal, the expectoration abundant. Three months later he decided to come to Paris, at which time we first saw him.

He is emaciated and pale, although his muscular system is still well developed. His strength has failed considerably within a few months. Cough frequent, and without noise, only producing a hollow and metallic sound; complete aphonia; deglutition of liquids impossible, except by very small quantities, and only when the head is thrown forward. In spite of these precautions, a few drops sometimes enter the larynx, which cause an obstinate and convulsive cough; larynx painful upon pressure. A careful examination of the mouth, that shows the tonsils are a little swollen, and that the mucous membrane of the back part of the pharynx, is covered with hypertrophied follicles.

The most scrupulous examination of the chest, at different times, gave no evidence of organic lesion of the lungs.

There was constantly a greenish, homogeneous expectoration, which is partially diluted in water, and settles to the bottom of the vessel, bearing a strong resemblance to tuberculous matter. This excretion was more abundant than it should have been if it came from the larynx alone.

Moreover, the nails had the peculiar conformation so often associated with tubercle, (*tabidis ungues adunci*), and this sign, conjoined with others, now assumed some importance.

Auscultation was deficient in one sign of immense value, the resonance of the voice. His aphonia prevented our observing its modifications; and as there was much hissing in the larynx, we could not appreciate the various respiratory sounds.

We put the patient on the use of asses' milk and artificial Bonnes waters; and of irritating, followed by narcotic frictions to the front of the larynx; we used insufflations of the subnitrate of bismuth, of alum, of sugar candy, calomel, and of acetate of lead; we touched the upper part of the larynx with a solution of nitrate of silver. All our endeavours were inefficacious; after remaining three months at Paris, M. L. departed for Dunkirk, where he used milk and Bonnes waters. It should be remembered that he had a cautery on one arm, a blister on the other, and a hemorrhoidal fistula, which suppurated considerably.

So far he has had no fever; about the beginning of November, the pulse was accelerated; the heat of the skin became more decided, and at the same time his appetite diminished, emaciation increased, and there was occasional diarrhœa; in a word, all the symptoms of consumption were manifested. Still, about the 24th of November, he had a fit of slight dyspnœa about three o'clock in the morning. The attack lasted two hours, and he was not otherwise disturbed. He had a slight paroxysm the next day.

26th. He had two less violent attacks.

27th. A much worse fit occurred in the morning, after which the difficulty of respiration continued. The attacks became more protracted and violent from day to day. He could no longer ascend the stairs without feeling suffocated. At night he could only sleep in a sitting posture, and propped up with pillows.

Although in our consultation we had foreseen this aggravation of the symptoms, and had presented the necessity of a surgical operation (tracheotomy,) the family remained free from alarm, and M. L. himself, who wrote to us on the 2d of December, spoke of *a rather greater difficulty of respiration, which was only experienced on going up stairs.*

But on the 5th of December, a fit of suffocation came on with so much violence, about four o'clock in the afternoon, that their family physician, Dr. Delherbe, was called for the first time. He found him in a state of impending asphyxia.

Dr. Delherbe instantly perceived the necessity for tracheotomy, but being unwilling to assume the responsibility of the operation, he wrote, with M. L.'s consent, for us to come with all haste.

We did not receive the letter until the 7th, at two o'clock p. m., started at seven, and were unable to reach Dunkirk until the 9th, at three in the morning, just two hours after M. L. had expired.

M. Delherbe gave us the following details:—The night of the 5th and 6th he was very much disturbed. As it had been observed that the attacks were worse at the close of the day, large doses of sulphate of quinine had been administered. The 6th was passed pretty comfortably; the night of the 6th and 7th was worse than the preceding. On the 7th there were two attacks which were near destroying the patient. The morning of the 8th he was in a horrible situation; from two until seven p. m., there was a little calm, after which suffocation recommenced with new intensity. At

nine, M. L. received the letter we had written from Paris two hours before our departure, by which we announced our arrival at ten o'clock; this hope made the patient more comfortable. At eleven suffocation became so threatening that Dr. Delherbe held himself ready for the operation. At one o'clock on the morning of the 9th, while we were detained at the port of Bergues by the severity of the military regulations, the patient, about to breathe his last, finally authorised M. Delherbe to practise tracheotomy.

This operation was neatly performed. A gum canula was introduced into the artificial opening, but was almost immediately obstructed, and death ensued a few moments after the operation.

At nine o'clock, eight hours after death, we proceeded to make the autopsic examination, assisted by MM. Delherbe and Boudinier. The lungs contained a great many crude tubercular masses; some were suppurated and excavated at the summit of the organ. There were no adhesions, nor traces of pleurisy nor pneumonia. We removed the tongue, pharynx, larynx and trachea. The tonsils were healthy; the tongue was *enormously tumefied*. At the base of this organ, on the sides of the epiglottis, the mucous crypts were larger and more rounded than natural.

Examining the posterior part of the larynx, externally, we found the epiglottis erect, swelled, hard, and the submucous cellular tissue œdematous and hard, as in the œdema of new-born infants. It looked like adipocire. The colour of the mucous membrane was rosy white. The epiglottis was curved towards its inferior face.

On the edge of the right aryteno-epiglottic ligament there were superficial ulcerations, continuous with those within the larynx.

All the lining mucous membrane of the larynx was ulcerated and scattered over with prominent pimples. The ventricles were scarcely perceptible, and only marked by an uneven line. Probing these ulcerations with the bistoury, prominent bony particles were found, which checked the instrument.

There were also numerous superficial ulcerations along the trachea. The mucous membrane was decidedly swollen, and of a diffuse rose colour. There were many points of ossification in the cartilaginous rings, sometimes opposite the ulcerations and sometimes separate from them.

After having the parts delineated by M. Chazal, we boiled them, the better to examine the cartilages. The epiglottis was not altered; the thyroid was completely ossified posteriorly and inferiorly, cartilaginous above and before, but friable, the cartilaginous insensibly mingling with the ossified parts. Anteriorly, and on the left side, the tissue, which remained cartilaginous, yielded under the least pressure, and was raised by fragments with the submucous cellular tissue.

The bony asperities, which we have mentioned in the midst of the ulcerations on the internal surface of the larynx, were intimately united with the cellular tissue, in the midst of which they seemed to take their origin, rather appertaining to the perichondrium than to the thyroid cartilage.

The cricoid cartilage was completely ossified, except its lower border, and in front; so that the ring was closed anteriorly by an isthmus of cartilaginous friable tissue. The parts which remained cartilaginous were locked between the bony plates of the ossified parts, and after boiling they separated just like epiphyses, and left an uneven and rough indenture.

Many of the tracheal cartilages were completely ossified.

Bonnet regarded scirrhus induration of the epiglottis as the cause of this extreme difficulty of deglutition. *Epiglottidem adeò quandoque induratum deprehendi, ut non solum, loquelæ abolitionem inferat, verum etiam non nisi frustra magna deglutire ægrum posse efficiat. Potus et omnia quæ cochleari exhibentur, tracheam intrant, rigidiores ab epiglottide non satis clausam. (Sepulcretum, lib. 3, sect. 4, Obs. VI.)*

This opinion appears to us quite as admissible as that which attributes the difficulty of deglutition to destruction of the whole or part of the epiglottis.

The symptoms enumerated by M. Louis are as follows:—Fixed pain in the upper part of the thyroid cartilage or immediately above it; difficulty of deglutition and rejection of drinks by the nose, the pharynx and tonsils being perfectly healthy.

These signs, collected by M. Louis from eighteen patients affected with ulcerations of the epiglottis, are sometimes incorrect, as we have proved, since they may all be present without our finding ulceration of the epiglottis, (Obs. 25,) and all may be wanting when the epiglottis is destroyed (Obs. 24.)

We regret exceedingly that so exact and minute an observer as M. Louis should have made no observations upon the introduction of food into the larynx, confining himself to its rejection by the nasal fossæ.

In the midst of the uncertainty which exists respecting the causes of food falling into the larynx during the act of deglutition, we shall not attempt to give an explanation of the phenomenon; for it appears to us impossible to refer it to any constant lesion.

Of the differences of symptoms according to the species of laryngeal phthisis.—We have mentioned the general symptoms of simple laryngeal phthisis; with a few exceptions they are found in all the species.

The tone of the voice, the cough, the local swelling, the mode of respiration and deglutition, are precisely the same, whatever may be the species, because they depend upon an organic modification common to all—to wit: the inflammation, ulceration, and narrowing of the larynx. But each species also offers some peculiar symptoms which it is interesting to observe, and which we shall pass in rapid review.

Syphilitic laryngeal phthisis.—When speaking of pain, we said there was very little in simple laryngeal phthisis. In this form it is sometimes very acute, especially in the act of deglutition, rather than when you press upon the upper part of the larynx. This

pain is explained by the pathological condition of the pharynx and tonsils, which are generally covered with ulcers, or are deeply furrowed with cicatrices; the veil of the palate is sometimes ulcerated. There is always a considerable erythema of the mucous membrane, and frequently more or less swelling of the submucous cellular tissue. There is sometimes œdema of the uvula and of the anterior pillars of the veil of the palate. *Touching*, which we have shown to be so unimportant in our diagnosis of simple laryngeal phthisis, is here often of great importance, and should never be neglected. Thus, in the case of M. P. (No. 49,) the introduction of the finger into the back of the mouth proved the existence of enormous syphilitic vegetations on the pharynx and over the superior opening of the larynx itself.

It is true that when the syphilitic ulceration is seated in the ventricles alone, or within the larynx, it cannot be distinguished by any peculiar sign, and can only be recognised by the previous history, and the collateral symptoms that may exist on the skin, the bones, &c.

The course of the syphilitic form is different from that of simple laryngeal phthisis. In the latter, the disease generally begins in the larynx or trachea, whilst in most cases the former is an extension of the lesions of the pharynx or nasal fossæ, so common in syphilis. It is therefore necessary to pay especial attention to this peculiarity; for experience shows that the larynx is ordinarily the seat of lesions analogous to those previously observed in the throat. Thus a syphilitic erythema of the nasal fossæ and pharynx is followed by laryngitis without ulceration; and, on the contrary, we may presume that syphilitic ulcers and necrosis exist in the larynx when an analogous lesion has been observed in the nasal fossæ, and when the tonsils and veil of the palate have been deeply ulcerated.

Tubercular laryngeal phthisis.—We admit the existence of this form whenever there is, at the same time, confirmed pulmonary phthisis. Hence we find in this species the signs of pulmonary consumption added to those of simple laryngitis. It is, then, by stethoscopic signs, by the nature and abundance of the expectoration, and by the rapidity of the emaciation, that we distinguish this species. In another place we shall state the manner in which we conceive simple laryngeal phthisis may give rise to tubercular pulmonary consumption.

When tubercles are once developed, the laryngeal affections will progress more rapidly. Indeed, in tuberculous patients we find the simplest phlegmasiæ have a fatal tendency to be aggravated, and to take on unmanageable characters. Thus, the slightest sprain occasionally becomes the cause of a white swelling, and the mildest affection of the larynx may occasionally cause laryngeal phthisis.

Hence, when making our prognosis of the diseases of this organ, we should pay the closest attention to the slightest signs of pulmonary tuberculation, and not anticipate a cure, when we can only

palliate the disease temporarily. The case of M. L. of Dunkirk, (No. 25,) is demonstrative of this. The following history is analogous; in it we obtained only an apparent cure.

OBSERVATION XXVI.

Tuberculous laryngeal phthisis at the onset—Thirty-seven years old—Born of a consumptive mother—Laryngeal hemorrhage—Hoarseness—Signs of tubercle—Apparent cure.

M. F. S., a lawyer, in the month of March, 1833, experienced an acute pain in the region of the larynx; for eight days there were fever and bloody sputa, which evidently came from the larynx. Active antiphlogistic measures were employed, and all the symptoms yielded in a week. The voice was at first a little hoarse, but became perfectly restored. M. S. occasionally took colds, but they never lasted more than three or four days.

He got along very well until the beginning of 1835, when a slight, dry cough came on, and a sense of pricking in the larynx. The voice was clear and sonorous. In June, 1835, the same symptoms as those of 1833 were renewed, after a violent diarrhœa, and lasted four days; they reappeared after a fortnight, but with less intensity. As the bloody sputa continued, M. S. came to Paris for our advice.

The voice was very weak and hoarse, the respiration rather short. The region of the larynx was rather painful, conveying the sensation of heat and pricking. Two or three times a day the patient experienced an obstruction in the larynx, and by *hawking*, rather than by a cough, he raised a semi-bloody, semi-purulent sputum, the size of a five-sous piece, which was all that he expectorated.

We called MM. Andral and Louis in consultation, who examined the chest carefully; there was a little dulness in the right posterior region, and resonance of the voice, without any sign of tubercular softening.

Still we decided that he had tubercles in the lungs, and feared that laryngeal ulcerations would soon be developed if they did not already exist. The patient was ordered to maintain silence, to drink asses' milk and artificial Bonnes waters during the autumn, to insufflate the subnitrate of bismuth, and afterwards a powder of one part of acetate of lead to seven parts of powdered sugar candy.

These measures were carefully followed, and we recently received a letter from M. S. in which he mentions his complete recovery; we do not believe that the tubercles were cured, but they do not manifest themselves by any symptoms.

Here we have evidently cured a laryngeal phthisis, which was tuberculous, in the commencement, and we have done in the larynx what is so often effected in the intestine. Indeed, when pulmonary tubercle has not advanced too far, it is easy to cure the diarrhœa

which depends upon incipient alteration of the glands of Peyer and Bruner. But when the tubercular cachexia has made any progress, the least irritation of these intestinal crypts immediately acquires an uncontrollable tendency to ulceration.

In the case we have just mentioned, it is probable that were the pulmonary tubercles to become softened, the commencing laryngeal phthisis which we had once so easily cured, would resist all our medications, however energetic and thorough they might be, and that it would go on, with the disease of the lung, to a fatal termination.

Cancerous laryngeal phthisis.—The symptoms of this form do not really differ from those of simple laryngitis; as may be seen by referring to case No. 18. We should suppose from analogy that the character of the pain would be important; but on consulting the only fact of this kind that we have met with, we find that the tumour never caused any lancinating pains, nor did the patient complain of any other difficulty than that inseparable from such a lesion as her case presented.

The presence of the fully developed tumour alone can aid us in the diagnosis, for in the early stages it would be impossible to distinguish it from any other tumour.

In the chapter on the different species, we said we might be justified in making a dartsous laryngeal phthisis—we will adduce our reasons. It is a fact, which cannot have escaped those who have studied the pathology of the larynx, that persons who have long suffered a chronic affection of the Schneiderian mucous membrane, often have phlegmasiæ of the larynx and pharynx, which alternate with the disease of the nose, or appear to be an extension of it. We have quoted a case (No. 44.) Many similar might be presented. But as these chronic phlegmasiæ of the nasal mucous membrane are generally chronic eczema, is it unreasonable to admit something of the same kind in the larynx? We leave our readers to decide the question.

Differential diagnosis.—There are three diseases with which it might be possible to confound laryngeal phthisis;—tracheal phthisis, œdematous laryngeal angina, and asthma.

The first we do not consider separable or distinguishable from laryngeal phthisis, with which it is almost always united, as we have shown in Chapter II.

M. Cayol, who sustained a thesis on *tracheal* phthisis in 1810, thinks, on the contrary, that this disease has characters peculiar to itself, but the symptoms he has indicated are so precisely those of laryngeal phthisis, that it would be utterly impossible to distinguish them. We have his thesis in our hand, and after having attentively revised his observations, we are convinced that the larynx had been superficially examined; our readers will no doubt unite with our opinion when they read of M. Cayol's patients dying generally with fits of *orthopnœa*, having the *larynx healthy*, and in the *trachea ulcerations which did not diminish its calibre*.

Edematous laryngeal angina is in nearly the same predicament. When this affection is acute, it can only be confounded with croup; when chronic, which is most frequently the case, it is oftener one of the terminations of laryngeal phthisis, and, therefore, merely a symptom of this affection. This is not the place to discuss the relations which exist between the two diseases; this important point in pathology will be treated at length in our chapter on terminations.

Asthma.—By this term, we do not mean the habitual difficulty of respiration which is observed in patients with disease of the heart or lungs. It appears impossible to confound this form of dyspnoea with that produced by laryngeal phthisis; we shall, therefore, say nothing about the differential signs. The only asthma about which there can be any doubt, is that singular nervous affection of the respiratory apparatus, characterised by paroxysms of orthopnoea, followed by more or less perfect calm in the respiration.

When you witness two cases, one caused by asthma, the other by narrowing of the larynx, you will be struck with the strong similarity of the phenomena. The attitude, expression, and muscular efforts are all alike; but one pathognomonic sign establishes an immense interval between the two diseases: in asthma, the voice is sonorous; in laryngeal phthisis, it is extinct. Without considering the period of the fit, if we compare the other symptoms, we shall see in what they differ. The oppression of asthma comes on suddenly, without warning, or appreciable cause; after a few hours, it ceases; and as it attacked its victim in the midst of full health, so it leaves him with no other symptom than a little fatigue. These fits of asthma have been preceded and are followed by others of a similar character.

But, in a large majority of cases of laryngeal phthisis, the orthopnoea comes on gradually, and has generally been introduced by a palpable difficulty of respiration, and by an alteration in the volume of the voice. When the paroxysm has ceased, the respiration is far from being clear; and the fits go on increasing in their intensity, until at last the patient reaches such a degree of asphyxia, that death is threatened, or is only averted by a surgical operation.

We, therefore, think it impossible to confound two diseases, whose course and form are so different.

CHAPTER VI.

TERMINATIONS.

§ 1st. Before we explain how simple laryngeal phthisis causes death, it may be well to enquire into the usual termination of consumption.

Death may be produced by tubercular pulmonary consumption;—this proposition, sustained by the highest authorities, appeared so evident, at first sight, that no one has taken the trouble to examine it, and it had almost become an axiom in pathology. We hope, nevertheless, to advance some opinions which have hitherto been considered paradoxical, though they are now beginning to be generally acknowledged and received by the profession.

The phthisis (consumption) would not be truly *pulmonary*, in the strict and literal sense of the term, unless the suppuration of the respiratory organ, its chronic inflammation, and its tubercular softening, had gradually carried the patient through all the stages of marasmus, until life was extinguished, without any other organ of the economy having been attacked.

But this is rarely the case: life is ordinarily destroyed by a host of sympathies, that have been awakened by the pulmonary phlegmasia, or by the absorption of morbid products. And, without speaking of functional lesions, such as the acceleration of the pulse, increase of heat, &c., we have many organic lesions, which, though secondary, are nevertheless often more immediately fatal than the primary affection itself. Thus, the colliquative diarrhœa of consumptives, which is the symptomatic expression of a phlegmasia in the alimentary canal, induces death more rapidly than the most extensive suppuration of softened tubercles. The secondary symptom has here more value than the primary lesion, if we regard only danger.

It being well established, that, in pulmonary phthisis, although the first disorder is evidently in the lungs, death is usually caused by more serious organic lesions foreign to the respiratory apparatus, we think it will be easy to assign the true nosological position of tubercular laryngeal phthisis.

If, indeed, the chronic disease of the larynx have long been the principal affection, it may be considered the cause of death; and, when alterations of other organs, more or less nearly associated with it, are also present, we must not deny the existence of laryngeal phthisis. In this case, the well-established priority of lesions would be our chief reason for naming the disease.

If the lung be first attacked, and if the mesentery and follicles of the intestine afterwards become the seat of disorders, which are more immediately mortal, we should, nevertheless, call the disease *pulmonary phthisis*. If, on the contrary, the tuberculous swellings of the mesenteric ganglia had marked the onset of the attack, and the ulceration of the small intestine had followed; and, finally, in the last stage of existence, pulmonary tubercles had been developed, and softened; we should say, (according to the expression of our predecessors,) that our patient had a *mesenteric phthisis*, upon the same principle that, in the other case, we decided upon *pulmonary phthisis*. For the same reason, when the series of local and general phenomena has clearly commenced in the larynx, and when, while the laryngeal lesion is still progressing, the lungs, the

intestines, and the mesentery present signs of tuberculisation, we should still say that the patient had *laryngeal phthisis*. You may say, if you choose, that he had laryngeal phthisis, then pulmonary phthisis, then tubercular enteritis, then mesenteric atrophy; but, at last, it was laryngeal phthisis.

Nevertheless, we admit there is an immense difference between laryngeal and pulmonary phthisis. This consists less in their cause (for both are considered tuberculous) than in the extent and importance of the diseased organ, and in the number of sympathies either may awaken. It appears that a chronic disease of the larynx would require a long time to cause death by *consumption*; whereas we all know the frightful rapidity with which it occurs in *galloping* consumption, as it is called. We do not wish to assimilate these species, but merely to show their points of contact.

Hitherto we have confined our comparisons to tuberculous affections, and we confess that our reasoning may be rather defective; indeed, tubercle is a general fact in the economy, and if the lungs be most frequently affected, it is no less true that almost all the organs may participate; the same is true of cancer. Hence it follows that the coincidence of lesions in different parts of the body does not by any means prove that there was a necessary connection between the primitive lesion, or rather between the organ first affected, and those which afterwards suffered. When, therefore, tubercles exist simultaneously in the lungs, the larynx, the intestine, the mesenteric ganglions, and in the various parenchymata, we are not bound to say that the patient suffered from *pulmonary* or *laryngeal* phthisis, but that he had a *tubercular phthisis*, which is quite another affair; but custom prevails, and the species of phthisis is named from the organ most *severely* affected; we shall conform to this usage, always observing the order of priority more than that of severity.

From all that has been said it results, that in *tubercular laryngeal phthisis*, death by consumption is less due to the lesion of the larynx itself than to the other accompanying lesions which are rather concomitant than consecutive. In fact this form is only the expression of a general morbid constitution.

Let us study simple laryngeal phthisis and ascertain how it may produce death. We have never seen a single case of chronic disease of the larynx which caused death by consumption; but other practitioners, whose testimony is unimpeachable, have seen what a long acquaintance with the hospitals and an extensive private practice has not exhibited to us. The cases which we have given under Nos. 8, 9, 10, 11, 12, 13, and 14, and which are annexed to the chapter on species, as types of simple laryngeal phthisis, sufficiently prove that the lesion of the larynx may alone produce death by consumption.

But we, as well as our predecessors, have observed chronic diseases of the larynx, causing a fever very like hectic, and producing considerable emaciation and debility; and, if the swelling of the

mucous membrane and the consequent suffocation did at last cause death, it is no less true, that decided consumption had commenced before the orthopnœa occurred. From this degree of consumption to that which characterises confirmed phthisis there is truly but a single step.

But how does death occur in the simple form of laryngeal phthisis? By consulting the cases we have cited it will be seen in an instant, that the hectic, the abundance of expectoration, the violence of the cough, the pervigilium, and finally the various derangements of digestion, have gradually destroyed the patient, while the autopsy discovered nothing to explain these secondary symptoms but the alterations of the larynx. Here we may truly attribute death to *laryngeal phthisis*, in the strictest sense of the word.

But these cases are very rare, as M. Andral¹ has observed.

Under ordinary circumstances, the affection of the larynx, when not far advanced, and when unaccompanied by an obstinate cough, or fever, or oppression, scarcely ever causes emaciation; but when these symptoms occur, the patients soon fall into a bad situation. Dyspnœa advances, and death supervenes on asphyxia. This is the most frequent mode of termination.

Here there is not, properly speaking, any *laryngeal phthisis*, for there is no consumption; but custom prevails, and this name is left attached to the disease, because the patient would have passed gradually through all the stages of consumption, had not his life been destroyed by the obliteration of the air-passages.

It seems difficult indeed, at first sight, to comprehend how a chronic ulcerative phlegmasia of the larynx could by itself bring on consumption. The surface of the mucous membrane is so limited, the suppuration is generally in so small amount, the pains so trifling, the sympathetic relations of the organ of so little importance, that it needs the imposing names we have cited in the chapter on species, to support belief in the existence of simple laryngeal phthisis.

We can readily understand how chronic inflammation, ulceration and suppuration of the kidneys, intestine, bladder, or a large portion of the cellular tissue, might gradually interfere with the circulation, excite febrile reaction and bring on marasmus. But here another circumstance must be taken into the account; the continuance of the cough which fatigues both the lungs and the expiratory muscles, and which prevents the patient's enjoying a moment's rest: the frequently considerable difficulty of deglutition, the impracticability sometimes of swallowing the least portion of food, without being instantly seized with convulsive cough and suffocation; in a word, pervigilium and inanition suffice, we think, to explain the marasmus and death.

Simple laryngeal phthisis, then, generally destroys the patient

¹ Clinique Médicale, tom. ii. p. 220.

differently from the two other forms, or from continuous suppuration in other organs, independent of tubercular lesion.

Pulmonary phthisis is a very frequent termination of laryngeal phthisis.

We have already stated that it often produces serious disorders in organs more or less removed from the lungs; we can suppose that it may itself be provoked by an analogous cause and be consecutive.

We have given some cases which show the justness of this view, and refer the reader to them. (Obs. 23 and 33.)

One of these cases is much more conclusive than the others in favour of this opinion, it is quoted from M. Bulliard.¹ (Obs. 33, bis.)

The subject of this observation, after having been tracheotomised on account of an acute laryngeal angina, wore the canula constantly for fifteen months. Eight months before death, a careful auscultation indicated no tubercles in the lungs, and autopsy showed many that were suppurated; hence it is difficult to believe that the phlegmasia of the larynx did not cause the development of these morbid products.

If we compare this case with that of Mme. Petit, (No. 18, Chap. *Species*,) we shall see the same cause producing a similar result. When this lady was carefully ausculted by M. Louis and ourselves, she presented no symptom of pulmonary tubercle; a canula was worn in the trachea, and besides the cancerous tumour in the larynx, partially softened pulmonary tubercles were found after death.

In these cases the conditions of the patients were very different. One was affected with a simple chronic phlegmasia of the larynx; he was a drunkard and debauched; his profession frequently exposed him to the inclemency of the weather; the other lived in comfortable style, had always led a regular life, and had a cancerous tumour of the larynx. So there was nothing in common between them, except that both wore a silver canula. Still, though in both the lungs appeared sound at first, they were found after death loaded with partially softened tubercles.

The same observations will apply to the case of Mme. Morin; when we first saw this patient, the larynx appeared the exclusive seat of morbid action, and the little hæmoptysis which occurred might well be attributed to the urgency of the cough. The most careful auscultation did not indicate any modification in the resonance of the thorax or in the respiratory sounds. The complexion was good, with considerable embonpoint. Some months later, however, the pulmonary affection broke out with much violence, and the patient died with purulent expectoration, and all the symptoms of pulmonary phthisis.

The following observation appears still more conclusive:—Miss

¹ Journal Hebdomadaire de Médecine, 1827.

Longet, aged thirty-two years, took a violent cold in the winter of 1834-35. There was fever, with emaciation, and an aphonia which lasted six weeks. A well-directed regimen and moderate antiphlogistic treatment quelled the symptoms, and at the end of two months health was perfectly restored. A year afterwards she took cold coming from a ball; the same symptoms were developed; fever, abundant expectoration, and loss of voice. An application of leeches and the continued use of emollients again stopped the fever and expectoration, but the aphonia and cough continued.

Six months afterward, the respiration became hissing and laborious: every thing indicated a considerable narrowing of the larynx. Death by suffocation was threatening; mercurial frictions to the front of the neck stopped the oppression. We then ausculted the patient with care; and M. Louis, called in consultation, examined her himself. We found a little obscurity of the sound, and bronchial respiration anteriorly and posteriorly.

It was evident there were tubercles, but we heard neither gurgling nor moist crepitus; there was not the least expectoration.

This case is precisely analogous to that of a woman who was tracheotomised by M. Fournet, under M. Andral, and who, at her entrance, offered no signs of pulmonary phthisis, but only an oppression which was so great that bronchotomy had to be practised. Some time after the operation, phthisis developed itself, and she died consumptive.

May we say of these patients that the lesion of the lungs was the cause of the laryngeal affection, which had existed long before the former developed itself; when the serious derangements were present in the larynx, and the most careful exploration of the thorax did not indicate the softening of tubercular matter?

These facts would go to support the opinion of Borsieri and Portal, who regarded laryngeal as a frequent cause of pulmonary phthisis. At any rate they are directly opposed to that of M. Louis; who considers the ulcerations of the trachea and larynx caused by the passage of pus, which could not have been the case in the instances just cited, since the tubercles were not softened.

M. Louis considers the irritation of the pus from the lungs, as the very probable cause, but he is not absolutely convinced of it. In the absence of this explanation, so *generally* satisfactory, may we not attribute it to *diathesis*, and admit the simple coincidence of the pulmonary and laryngeal lesions without regarding them as causes one of the other?

We often see a joint become the seat of white swelling, and pulmonary phthisis shortly after developed; in other cases, a chronic diarrhœa persists for several months, owing to the tubercular ulceration of the glands of Peyer, and the lungs remain a long time unaffected. It is generally the tuberculous softening of the lung which continues and the intestinal lesion that follows. To us, these alterations do not appear to be causes of one another, but only the product of the tubercular diathesis, which generally

attacks the lungs first, but which, in some rare instances, affects some other organ, and only attacks the lungs secondarily; and besides, it will be readily understood that there is a more intimate bond of connection between the larynx and lungs than between the latter and any other part of the system.

It is not, then, as Borsieri thought, laryngeal which caused pulmonary phthisis, any more than the pulmonary lesion, which, according to M. Louis, causes the laryngeal disorders. The question is simply, whether the lung or the larynx have been first affected; and this problem is difficult to solve.

Before Laennec discovered auscultation, the opinion of Borsieri necessarily prevailed; indeed the presence of pulmonary tubercles could not be determined until they were far advanced, while all were struck with the symptoms of disease in the larynx. But in our day, the exploration of the chest may be so precise, that the alterations of the lungs are often revealed before the cough, hemoptysis, and purulent expectoration proclaim tubercular phthisis.

It is not every one, however, who can detect the early stages of disease in the parenchyma of the lungs; great practice of auscultation, and constant attendance on the hospitals, are necessary to distinguish these changes in the intensity of the respiratory sounds, and the resonance of the voice, which have so great a diagnostic value. Even where an appreciable alteration in the resonance of a part of the lung, in the respiratory murmur, or in the voice exists, we must not always decide upon the existence of tubercles; but by frequently repeating the examination of the patient, and by watching the progress of the signs furnished by auscultation, we learn to decide with certainty.

The aphonia, the narrowing of the larynx and consequent oppression, are the grand obstacles to auscultation. On one hand, we cannot explore the resonance of the voice, which furnishes such valuable diagnostic means; on the other, the hissing in the larynx so masks the noise of respiration that it becomes impossible to detect the slight changes of which we have been speaking. This we found to be the case with Mr. L. of Dunkirk, whose case we have given in No. 25. The sound was less clear without being obscure, and as this semi-obscurity was observed in the whole chest, it would not serve to decide the relative predominance of the pulmonary lesion (the autopsy, indeed, showed that the lungs were equally loaded with tubercles in their whole extent.) The respiratory sounds disappeared entirely in the midst of the bronchial and laryngeal gurgling, and the complete aphonia did not permit us to examine the resonance of the voice. Still the tubercular pulmonary phthisis was palpable: the abundance of purulent expectoration, the hectic fever, the diarrhœa, the emaciation, and night sweats, all concurred in leading us to this diagnosis, which we could not establish by stethoscopic signs. It was exactly the same with M. Prévot, a relation of Dr. Honoré. He was affected with pulmonary and laryngeal phthisis in the last stages, and neither percussion nor

auscultation enabled us to recognise the presence and softening of tubercles from the same causes which operated in Mr. L. of Dunkirk.

We conclude, 1st, that, in most cases, tubercular pulmonary phthisis is first established, and that the larynx is afterwards affected.

2d. In some rare cases the tubercular lesion commences in the larynx, and only invades the lungs secondarily.

3d. That sometimes both exist and progress simultaneously.

4th. That in this case the lesion sometimes seems to exist exclusively in the larynx because of the predominance of the laryngeal symptoms, and the difficulty of ascertaining the pulmonary lesion by stethoscopic signs.

We have said that marasmus was rarely caused by laryngeal phthisis. Among the causes which induce death before marasmus comes on, we mentioned the swelling of the mucous membrane of the larynx, produced by its ulceration or chronic inflammation.

As this is one of the most frequent and serious causes of death, we shall devote a paragraph to the study of the connections that exist between this swelling of the mucous membrane, which has been made a special disease, and the acute or chronic phlegmasia of the parts which compose the larynx.

§ 2. *The relation which œdematous laryngeal angina bears to laryngeal phthisis.*—Our object, in this paragraph, will be to prove that œdematous laryngeal angina scarcely ever¹ differs in its characters from the inflammatory œdematous laryngeal angina described by authors, and of which Boërhave has left us so faithful an account in the following aphorisms.

Aph. 801. "Si sela laborat pulmonalis fistula, illæsis allis, in internâ membranâ suâ musculosâ tunc oritur ibi tumor, calor, dolor, febris acuta calida, ceterum externa signa nulla; vox acuta, clangosa, sibilans; inspiratio acutè dolens; respiratio parva, frequens, erecta, cum summo molimine; hinc circulatio sanguinis per pulmones difficilis; pulsus mirè et citò vacillans, angustix summæ; cita mors. Est que hæc una ex iis quæ funestissimæ nec externa dant signa: quò verò propriùs glottidi et epiglottidi malum, eò sanè magis lethale."

Aph. 802. "Si larynx imprimis acutè inflammatur, et sedem habuerit malum in musculo albo glottidis et simul in carnis ei claudendæ inservientibus, oritur dirissima, subito strangulans,

¹ We say *scarcely ever*, because in the numerous examples of diseases of the larynx which have fallen under our own observation, or of which we have read in authors, we have found but one which could fairly be considered as belonging to the œdematous laryngeal angina of Bayle. It is as follows:—A little girl, eight years old, had had scarlatina. Eight days after the close of the disease, she was taken with general anasarca; the face, lips, and mouth were infiltrated, and soon after all the symptoms of an œdematous angina appeared; laxatives and diuretics were actively employed; diaphoresis was established, the urine flowed abundantly, the anasarca disappeared and with it all the symptoms of suffocation.

angina. Signa ut priora (801,) dolor in elevatione laryngis ad deglutitionem ingens, acutus inter loquendum atque vociferandum; vox acutissima, stridula, citissima, cum summis angustiiis, mors. Estque hæc, sine signis externis, omnium pessima."

Bayle was the first to trace the history of this serious malady. Bichat¹ speaks of the infiltration of the aryteno-epiglottic ligaments as a fact known to practitioners; could he have referred to the observations reported by Morgagni? for they are the only cases we know of anterior to him.

On the 18th of August, 1808, Bayle read a memoir, to the Society of Medicine, on a disease which he called *œdema of the glottis*, and which he regarded essentially different from inflammatory laryngeal angina.²

In 1815, Thuilier, a student of the Paris faculty, advanced the same opinion in his inaugural thesis; and since that period *œdema of the glottis* has been considered a special disease in our nosography.

It was not until 1825 that M. Bouillaud dared to contradict the opinion of Bayle and Thuilier, and as no remarkable monograph has been published since that time, the question remains unsettled, balanced between isolated cases, which prove the old or the new theory, as their authors were inclined to the one or the other. We think it may not be uninteresting to discuss these two opinions, and hope to throw some light upon the question, as we have more cases than our predecessors, and are perhaps better situated than they were for observing this class of diseases.

Morgagni, as quoted by Bayle and Bouillaud, speaks plainly, in his fourth letter, of alterations in the larynx, which correspond to *œdematous laryngeal angina*. We shall not advert to the case in letter 43, art. 24; there is no doubt the disease was the dropsical or catarrhal angina, which Bøerhaave mentions (Aph. 791,) and we are surprised that this should have escaped both Bayle and Bouillaud. Let us see what Morgagni says of the former, in art. 26, (let. 4,) and of the alterations found at the examination of his throat after death.

"Ore autem denique aperto, primum in conspectum venit tumor nuci juglandi fermè par, qui dexteram palati partem quàm molaris dens erat plurimum vitatus, et exesus cum continente gingivâ occupabat, et pure ex parte cocto turgebat. Porro membrana quàm uvula et contiguæ partes, atque exterior larynx ad extremum usque epiglottidis apicem conteguntur, cum in summo livida erat, tum concisa, innumeras quasi cellulas sub se ostendit, quarum tenues et subrubri

¹ Anatomie Descriptive, Paris, 1823, tom. 2, p. 404.

² We may observe that the name *œdema of the glottis* is inappropriate, not for the reasons advanced by M. Olivier des Brulais, in his inaugural thesis before the Faculty of Medicine of Paris, October 11th, 1835, but because *the glottis is an opening*, and cannot be *œdematous*; he should have said *œdema of the walls of the glottis*. We shall hereafter make use of the expression, *œdematous laryngeal angina*.

parietes quâdam, ut sic dicam, *gelatina*, cellulas complente, distendebantur. Quæ his cellulis suberant, ea quidem sana apparebant ; at interior tamen laryngis facies subrubro colore propè glottidem infecta erat, ipsaque glottidis latera quæ ceteroquin albicabant, ut solent, *multa magis quam soleant connivebant.*"

How was it possible that Bayle did not perceive that the tumour of the mouth was the principal disease and cause of all the symptoms? Why did he not recognise, in the livid colour of the epiglottis, and the sanguine injection of the mucous membrane of the larynx, the signs of inflammation in these parts? We are surprised that Bouillaud did not use this case when combating the opinions of Bayle.

When we read the eminent author's memoir, as republished in the Dictionary of Medical Sciences, vol. 18th, we are struck with the number of contradictions it contains.

At page 506 we find, "no one can confound œdematous with inflammatory laryngeal angina, so well described by Boerhaave, § 801 ; the violence of the fever in the latter disease, and its absence in œdema of the glottis, sufficiently distinguish these two affections which differ in other respects."

At page 507, after saying that œdematous laryngeal angina is either primitive or consecutive, he adds:—"when primitive, it appears to belong to a catarrhal or inflammatory affection of the larynx;" and further on, treating of the causes, he writes:—"they (causes) are all those of *inflammatory* and *catarrhal* diseases *operating on an individual predisposed to an irritation of the larynx*. But what this predisposition is, or how it differs from that which produces inflammatory angina, I am unable to decide, &c."

Here we have an angina that is not inflammatory, which appears to belong to a *catarrhal* or *inflammatory* affection, and produced by all the causes capable of exciting inflammations, separated from the inflammatory angina of Boerhaave, because the latter is always accompanied by fever, while the former "is not *generally* so attended."

Does not the general reaction of the organism against offending agents, which we call fever, depend, when consecutive, upon the gravity of the local lesion, and at the same time upon the actual condition of the subject? When the local lesion is slight, when the individual has a feeble constitution, or is exhausted by long and painful disease, the reaction will participate in the debility of the patient, or the slowness of the local lesion. This, we think, must be admitted by all, and it is conceding that both diseases are the same, except that one has fever and the other generally wants this symptom.

In the passage we have quoted, Bayle asks how the predisposition to the two diseases differs; but he tells us, that all the patients in whom he found œdema, "were persons enfeebled by previous sickness," and, consequently, the febrile reaction, if present, was necessarily feeble.

The pale colour of the epiglottic ligaments observed in the sub-

jects examined by Bayle and Thuilier, is sufficiently explained by the following reflections:—

1st. As these ligaments were infiltrated with pus or sero-purulent matter, it is not surprising that they should assume the colour of the liquids they contained. Besides, we do not know of an example of pus being *formed* without decided inflammation, and this argument of the white colour of the parts infiltrated would be wholly in favour of those who regard the disease as an inflammatory affection.

2d. The white colour is not constant, and when the patient has died suddenly, especially when the disease had seized him in perfect health, or during the existence of an inflammatory affection, as in Obs. XXVIII, the parts have frequently been found red and inflamed.

3d. It is not surprising that the aryteno-epiglottic ligaments should be infiltrated with pus after an inflammation, and pale after death, for the same thing is every day observed in parts invested with loose and lamellar cellular tissue, as in the eyelids after erysipelas.

4th. Finally, when the engorged ligaments are found white, without containing pus in the cellular tissue, we should not be more surprised than we are when we see a pale or yellow conjunctiva in patients who died with chemosis, a pale or yellow pharynx, when they died of a pharyngeal angina, or a pale face, in the bodies of those who died with an intense erysipelas of that part.

It would be useless to argue from the peculiar character of inspiration, or the alteration of the voice, which is the same in the inflammatory form as in the œdematous; and as for the inspiration, it will be more difficult, if the tumour be soft, and occupy the epiglottic ligaments, so that it may be pressed into the larynx by the current of air, than when the disease is seated lower down, in which case expiration would be more difficult, but that would not justify us in saying that the *nature* of the disease has varied with the place in which it is situated.

We hope to be pardoned this digression, which may seem foreign to laryngeal phthisis, but it was necessary to establish the inflammatory nature of the idiopathic œdematous laryngeal angina of Bayle.

Let us now examine the consecutive laryngeal angina, which this author has only mentioned, and which, by its frequency and severity, exerts great influence on the other form.

When a wound or ulcer occurs in any portion of the body, the surrounding parts are soon infiltrated with fluids, become engorged, and form a tumour which varies in size, sensibility, and colour, according to its situation, the constitution of the patient, and often according to the *nature* of the lesion which gave rise to it. We then call this tumour an inflammatory engorgement, not because the part is inflamed, but because the engorgement was caused by inflammation in the neighbourhood. When this occurs in parts not essential to life, it is scarcely noticed, because we know it is a

natural reparatory effect of inflammation, which will disappear with the loss of substance, which is the principal affection, and towards which we should direct all our efforts.

The scientific practitioner will always ascertain the nature of the lesion, and, without caring for the consecutive symptom, will adopt an appropriate course of medication.

But, when the engorgement is so situated that its presence excites the most serious symptoms, as when a chancre causes infiltration of the prepuce, threatening a phimosis or paraphimosis; or, when a scratch on the conjunctiva creates a chemosis, which threatens the loss of vision; or, when any lesion, traumatic or secondary, has caused infiltration of the upper borders of the larynx, or the submucous cellular tissue within it; the engorgement becomes the principal affection, because its presence would cause more serious symptoms than the disease itself, and all our therapeutic agents should be directed against this symptom.

In these few words is contained the history of consecutive œdematous laryngeal angina; which, we think, should never have been established, as it has been by Bayle, who contends for the absence of inflammation, and by Bouillaud, who holds an opposite opinion. To explain our idea:—when there is an ulceration in the larynx, on the epiglottis, or on the lateral ligaments, the inflammation may be propagated so far around the ulceration as to provoke a considerable afflux of blood, and thus produce an inflammatory tumour in the ligaments; indeed, this is just what we saw occur in the patient of No. XXVII, the first case of M. Bouillaud's memoir.

But it may and frequently does occur, that the tumefaction of the cellular tissue of the superior extremity of the air passages is only the result of infiltration about a wound. Should the angina, in this case, be considered independent of any inflammation? We think not; for if there had not been inflammation, the infiltration would not have occurred.

The dog which Bichat mentions¹ was attacked with as clear a case of inflammatory angina as could possibly be found.

The patient mentioned by Olivier des Brulais, quoted by us under No. XXX,² the subject of the sixth case of Bayle, and those we record under Nos. I, XXII, XXIV, XXV, and XXXI, are nearly parallel.

We have found, in our own practice, five cases that exhibited all the stages of consecutive œdematous laryngeal angina. An examination of the plates by Chazal, Nos. 1, 5, 6, 7, 8, and 9, will

¹ *Anat. Descript.* tom. ii. p. 404. Bichat had passed a piece of pack-thread around the epiglottis, and thus withdrew the upper part of the larynx through a wound in the front of the neck. The next day he found the animal dead; the aryteno-epiglottic ligaments were the seat of a *serous infiltration*, which he considered the cause of death.

² We beg the reader to examine the autopsy of this case, and the deductions which follow.

give a better idea of the disease, and the various lesions that may excite it, than any descriptions.

We may then sum up our views of œdematous laryngeal angina in the following propositions:—

Bayle was right in distinguishing two species of the disease, a primitive and a consecutive. When primitive, it is almost always the result of an inflammatory fluxion of the larynx or neighbouring parts, and does not differ *in its nature* from that described by Boerhaave, (aph. 801 and 802.) When consecutive, that is, when occasioned by some organic lesion of the larynx or its dependencies, it may be inflammatory and active, or without inflammation and passive. In the first case, the action is propagated from the seat of the lesion to the epiglottic ligaments, or to the laryngeal mucous membrane. In the second, the serosity accumulated in these parts is owing to the usual engorgement of fluids around any loss of substance. In neither case, can we regard the œdematous laryngeal angina, connected with ulceration, as independent of inflammation.

Finally, whatever may be the origin of laryngeal phthisis, it should be considered the most frequent *cause* of œdematous laryngeal angina.

It may produce it, 1st, from its commencement, when the parts usually ulcerated are only partially inflamed, and then engorgement, being the only appreciable lesion, may be regarded as primitive. 2d; when, having caused general derangement in the larynx, it produces accumulation of liquids in these parts, and then the disease is consecutive.

In the last case, the engorgement from ulceration may be active, which happens when the disease progresses rapidly, as in case No. XXVII; or it may be passive, when the ulcer occurs in a chronic case.

The last species of consecutive œdematous laryngeal angina is most frequent; it is that we have seen, and of which we have reported many cases.

§ III. *Termination by cure.*—Laryngeal phthisis may terminate in recovery. We may hope to obtain this result, at the commencement, and before any considerable organic lesions have altered the tissues of the larynx and trachea. Indeed, when the disease is far advanced, and has debilitated the system by habitual dyspnœa, cough, and prolonged abstinence, and when signs of marasmus have begun to be developed, there is little hope left of saving the patient.

Still, the case given by Morgagni¹ proves, that we should not despair of success, although the local disorders be considerable, and of long duration. He mentions an old man who had often had syphilis, and who had long suffered habitual dyspnœa. After death, cicatrices were found on the base of the tongue. The epiglottis had been eroded on its edges, and resembled the parallel

¹ De sedibus et causis morborum, epist. 44, art. 15.

organ of a dog. The internal surface of the larynx and trachea was also cicatrised, as though the ulcers had been very deep. Their syphilitic character may have rendered the treatment more successful than it would have been in an ordinary case.

Many cases will be found in the chapter on treatment, which will give a better idea than any thing we can say, of what the physician has to fear or hope, according to the different species, cause, or degree of the disease.

We now proceed to the cases upon which we must depend for the support of the other propositions laid down in this chapter.

OBSERVATION XXVII.¹

Acute inflammation of the larynx and pharynx, œdematous angina of Bayle—
Death by asphyxia on the seventh day from the invasion of the disease.

P. L. aged 34 years, a cook, large, and of strong constitution, was brought to the Cochin Hospital on the evening of the 29th of December. She presented the following severe symptoms:—orthopnœa, inability of opening the mouth and swallowing, guttural rattle, voice hoarse, extinct, speech interrupted, sense of suffocation, face discoloured, slightly bluish and dull, expressive of fear and anxiety, the eyes sunk, livid and inanimate, loss of strength, pulse small, feeble, not very frequent. It required great effort for her to tell us she had been sick but four days, that after exposure to cold, while in a perspiration, she had been seized with rigors, trembling, and a violent pain in the throat, and that, notwithstanding the application of fifty leeches (at twice) to the throat, the disease still progressed. Although she appeared in a desperate situation, we proposed more leeches, to which she at first objected on the score of debility, but finally consented. Fifteen were then applied to the front of the neck, and she took a soothing draught. The night was passed in dreadful agony, tormented by threatened suffocation, the patient could not enjoy an instant's repose. The next day deglutition was easier; the patient *expired* rather than expectorated purulent matters mixed with blood. The rattle was not so strong, the respiratory murmur was feeble in all the anterior region of the thorax, the only part we could examine in the state of anxiety and *jactitation* of the patient; the orthopnœa continued; the pulse was small and laboured, the skin was rather cold than hot; being overcome by long and painful pervigilium, she frequently fainted from the violence of the dyspnœa; she asked for wine and broth to sustain her, but was allowed nothing but two soothing juleps which she swallowed with difficulty.

At one o'clock in the morning her countenance was almost cadaveric, with general pallor; a sensation of burning heat, coinciding with decided chill of the surface; eyes glazed, braying rhonchus,

¹ The first case of Bouillaud.

impending suffocation; pulse thready, frequently losing itself under the fingers; intellect perfectly clear. On the 31st, at 7 A. M. there was loss of recognition; the skin was covered with cold sweat, the pulse scarcely perceptible, and fugacious. Death followed in a few minutes.

Autopsy thirty-six hours after death—1st. *External appearance*.—The body of a robust female, with considerable embonpoint.

2d. *Digestive and respiratory organs*.—The mucous membrane of the pharynx and larynx presented a decided redness and a beautiful injection, which abruptly terminated at the œsophagus, but was prolonged into the trachea. On the left side of the larynx there is an ulceration with a grayish bottom, and raised red edges, altogether resembling a chancre. The epiglottis is inflamed, and more than three lines thick, its ligaments are similarly situated. The surrounding cellular tissue is considerably thickened, infiltrated, and engorged, so that the glottis looks more like a hole than a cleft. The cavity of the larynx is filled with frothy and ropy mucus; the external muscles of this organ appear healthy. The tonsils are red and inflamed; the left is singularly tumefied and ulcerated, and infiltrated with pus, which gives the substance a grayish colour. All the front part of the neck is tumefied, and the cellular tissue interposed between the muscles is infiltrated with pus which increases in quantity towards the hyoid bone and larynx. The thyroid body is soft and infiltrated with a yellowish viscid humour. The two lungs are generally crepitant, except at their posterior margin, where the tissue is compact, easily torn, of a red colour mixed with gray, purulent, and evidently inflamed. The mucous membrane of the bronchia is injected, and of a bright red; their cavity is filled with rust-coloured frothy mucus. The peritoneum is covered with scattering melanotic granulations, probably the effect of an ancient peritonitis. The mucous membrane of the stomach is red and injected, especially towards the pyloric region, where there are long, irregular, superficial ulcerations. The mucous membrane of the intestines is healthy throughout.

3d. *Organs of circulation*.—The heart is large and well formed and very fatty. Its cavities, the aorta and the large veins, are filled with fibrinous clots, some white, and others red.

OBSERVATION XXVIII.¹

Acute inflammation of the pharynx and larynx—Œdematous angina of Bayle—The patient objected to leeches, and died on the seventh day.

Eleanor Lemindre, seamstress, aged thirty-four years, of a lymphatico-sanguine temperament, had entered the Cochin Hospital for a disease of the heart, from which she was convalescent, when, on the 23d of February, 1822, after having eaten more than usual,

¹ The second observation of Bouillaud.

she was seized with a violent chill, followed by frequent vomiting. The next day there was an erysipelas of the face; the tongue was red, great thirst, hot skin, and frequent pulse—(sweetened gum water.) On the 25th and 26th the erysipelas spread towards the neck and scalp; the eyes were completely closed by the tumefaction of the lids. The erysipelas continued to progress on the 27th, with acute pain in the throat, difficult deglutition, laboured, high and hurried respiration; (leeches were directed, but she obstinately rejected their employment.) On the 28th the patient felt strangled by the inflammatory swelling in front of the neck; respiration, speech, and deglutition became more and more difficult; there were alternations of agitation and sinking, and as she was no longer strong enough to cough or spit, she constantly put her fingers to the back of her mouth, as though she wished to tear away the obstacle to respiration. The next day, March 1st, the tumefaction of the neck was enormous, suffocation imminent, aphonia almost complete. The patient, justly alarmed at the severity of her symptoms, agreed to have the leeches applied; but it was too late, and she died in a state of asphyxia two hours after their application.

Autopsy twenty-four hours after death.—Considerable embonpoint. The mucous membrane of the bronchia, larynx, and pharynx, is red and inflamed; the epiglottis and its ligaments are considerably thickened; the glottis looks like a very narrow hole, which is owing to the swelling of the neighbouring parts, and also to the mucus lodged between its lips. The cellular tissue of the larynx, neck, face, and especially that of the eyelids, is swelled, injected, reddened, œdematous, and infiltrated with pus. The lungs are generally crepitant, and not much engorged, even posteriorly. The mucous membrane of the stomach, particularly at the pyloric extremity, presents a redness, which extends into the duodenum, jejunum, and ileum, where it terminates by fading away gradually. The large intestine is contracted and healthy.

OBSERVATION XXIX.

Acute inflammation of the pharynx (œdematous angina)—Late application of leeches—Death in six days.

Chas. Garnier, a stone cutter, had frequently suffered with thoracic disease, and was about leaving the Cochin Hospital, where he had been treated for rheumatic pains, when, on the 10th and 11th of November, he complained of pain in the throat, and symptoms of angina, which had probably been produced by exposure to a current of air. There was much fever on the 11th, for which a mustard pediluvium was prescribed by the resident student. On the 12th the symptoms were aggravated; the air passed through the larynx with difficulty; the patient was oppressed, and breathed with his mouth open, and with a rattle; his words were not clear, but confused, which announced considerable swelling of the tonsils; he also swallowed with extreme difficulty; (eighteen leeches to the

throat.) In the night of the 13th and 14th he was agitated and excited. On the 14th, at the morning visit, he was dull, his face wan and livid, his lips discoloured, rather bluish; respiration frequent, hurried, with a rattle like that of the last agony; nose drawn, alternate dilatation and contraction of the nostrils; mouth always wide open, extremities cold, pulse accelerated, quick and convulsive.

Although death from suffocation appeared inevitable, we applied twenty-five leeches to the throat. The unfortunate being, whose agony must have been horrible, was so unwilling to acknowledge the danger of his situation, that he pretended there was no difficulty in respiration.

At the evening visit he told us that the leeches had relieved him, and that his respiration was easy. But it was exceedingly difficult, and always accompanied with a guttural rattle; a dry, rumbling rhonchus was heard in both sides of the thorax; the face was livid and cold, the pulse small, frequent, and slender; decubitus on the back, prostration was so great that he could neither expectorate nor spit; on the 15th he was even worse; there was more drowsiness (a large blister to the front of the neck.) At five in the evening the tracheal rattle was more braying; the body was uncovered, and all the extremities were cold, but the patient told us, with a smile, which gave a truly singular expression to his cadaveric countenance, that he was getting better and better; nevertheless, every thing announced approaching dissolution. He was still, his pulse thready, and he spoke with so much difficulty that most of his words were unintelligible. We had scarcely left the chamber when we were told he had expired.

Autopsy twenty hours after death.—Skin discoloured; emaciation.

Respiratory and digestive organs.—One half of the glottis was natural. Its contraction is produced by the swelling of its lips, which are enormously thickened; the arytenoid muscle itself was decidedly infiltrated. In the part occupied by the tonsils there was a grayish ulcerated surface; the external part of these organs was all that remained; it was softened, infiltrated with blood and pus, and almost like a portion of softened brain; the pharynx was scarcely injected.

The cellular tissue, which immediately surrounds the tonsils, was red and suppurating; that about the pharynx and larynx was œdematous, and presented some drops of pus infiltrated into its cellules. The laryngeal mucous membrane was covered with purulent mucus, and injected, but not so red as that of the trachea, the bronchia, or their ramifications.

The left lung was crepitant and healthy, while the right was heavier, infiltrated, and engorged with blood at its base and middle. Tubercles and pleuritic adhesions are evidences of the thoracic difficulties which he had experienced.

The mucous membrane of the stomach presented a rosy tint

which increased towards the pylorus, where it was covered by a thick layer of mucus.

The mucous membrane of the small intestine was only red at the end of the ileum. The inner surface of the colon was pale, and there were two small tubercles; the colon was healthy.

The external portion of the fibrous membrane of the spleen was transformed into a fibro-cartilaginous matter more than a line thick.

Circulatory organs.—The right side of the pericardium was covered with whitish pseudo-membranous patches. The heart was of usual size, its internal membrane reddened, its right cavities filled with coagula, generally white, and like gelatinous false membranes; it might be said that vessels had begun to form.

OBSERVATION XXX.¹

Œdematous laryngeal angina—Laryngotomy—Death on the fourth day after the operation—Œdema of the epiglottic ligaments and inferior vocal cords—Caries of the cricoid.

M. Barbe, captain of a coaster, aged 45, of a lymphatic temperament, had been subjected to a long mercurial treatment, operated on for hydrocele in both testes, and still has two hard tumours in his scrotum, one of which is very voluminous; towards the end of September he had an abscess opened at the back of the mouth, the cicatrix of which is now gaping.

Since then he has had constant pain in the direction of the larynx and above the sternum; voice hoarse.

About the 10th of March, 1833, a blister was applied to the nucha, but without any beneficial result. On the 20th he left Bordeaux to take his vessel to Nantes. The disease in his throat had been growing worse since January. Arriving at the mouth of the Loire in rainy weather he felt the pain increasing, but was still obliged to command the vessel. On the 26th he consulted Dr. G. at Nantes, for a deep seated pain in the tracheal region; as this physician did not observe any alarming symptom at his first examination, he prescribed six leeches to the neck, and a foot bath. The next day Dr. G. found respiration calm, pulse natural, voice hoarse, and the larynx painful; he prescribed six more leeches, to be followed by cups, and ordered a blister to the seat of pain. At length the orthopnœa, the hoarseness of his voice, and inspiration, and all the symptoms of œdema of the glottis, had become so distressing, that he was persuaded to leave his lodgings and enter the hospital of Hôtel-Dieu, on the 29th of March. Respiration is anxious, hoarse, and sonorous; inspiration difficult; expiration easy; imminent suffocation; aphonia or suppressed voice; moist skin; small, accelerated pulse; countenance expressive of pain. The

¹ Extracted from the inaugural thesis of O. des Brulais, April 11th, 1835.

patient has great courage, and views his desperate condition with sang-froid. The mucous orifices are discoloured, the complexion yellowish, the muscles soft, though sufficiently developed; except some dysphagia, the digestive functions are healthily performed; the whole buccal cavity is pale. The tonsils are not swollen, the posterior pillar of the left side only appears red and a little enlarged, the right has a plain cicatrix.

Ipecac. grs. xxx.; emollient gargle with honey of roses ʒj.; laudanum gutt. xx.

At six o'clock, many pints of water had been vomited without any decided improvement; orthopnœa continues, with moist skin and accelerated pulse.

At eight, the symptoms were progressing; the face was violet, and the pulse became more active. The sitting posture was maintained, with the head thrown back, especially during inspiration.

Sinapisms to the arms and thighs; insufflations of alum to the pharynx. This produced nausea; convulsive efforts to clear the throat, but with slight relief.

At nine, the orthopnœa became more violent; suffocation was impending. I spoke, in his presence, of the only means that could save him from certain asphyxia.

At ten, M. Barbe sent for me to perform the operation. The pulse was one hundred and twenty-five, small and thready; the face bathed in sweat; the lips violet; the trunk straight; the neck rigid; the mouth open; the trachea raised; all the respiratory muscles were convulsed to effect a few, short, hoarse, distant, jerking, incomplete inspirations.

At half past ten, the face being almost cyanotic, and covered with cold sweat, an incision was made on the median line of the thyroid cartilage, and extending to the prominence of the cricoid, being an inch in length; the lower edge of the thyroid and the upper margin of the cricoid were exposed; the muscles were separated by the head being spontaneously thrown back. The crico-thyroid membrane was next exposed, and a transverse incision was made near the superior edge of the cricoid ring. No artery was cut, and there was at first little venous blood. The barrel of a goose-quill was introduced, and secured as a canula. The lips of the wound would not unite, notwithstanding all our efforts, as the epidermis had been removed by the blister.

The canula had scarcely been arranged before the braying hoarseness of the inspirations ceased; the air was sent deep into the bronchia, with immediate relief; the face resumed its colour; the pulse its volume. The first hour there was cough with efforts to clear the throat. The colour of the sputa proved that some blood flowed into the trachea; and to meet this accident, I had no other resource than to apply my mouth to the canula, and draw off the blood which seemed to obstruct the bronchia. The hemorrhage was checked towards eleven o'clock, and respiration seemed to adapt itself to the new air passage.

Mixture of syrup of poppies, $\mathfrak{z}\text{j}$.; syrup of orange flowers, $\mathfrak{z}\text{j}$.; gum water, $\mathfrak{z}\text{jv}$. by the spoonful; deglutition was easy, and towards midnight the patient fell asleep. Respiration was now calm; the sound resembled that of a person asleep, breathing through the nostrils.

About three o'clock in the morning the patient awoke; the body was moist; perspiration on the face. He said the quill was not large enough. He spoke in a low tone when we applied the finger to the opening: the tube was obstructed by inspissated mucus, which was removed by a silver probe, and the respiration being again free, he went to sleep. The pulse was full, but not accelerated; there was no hemorrhage. At times, respiration was not so free, but relieved by clearing the tube, so that he had no return of dyspnœa.

30th; seven, A. M. Respiration perfectly performed through the canula; the pulse full, rather frequent; the skin of natural heat and colour; the patient was in fine spirits; there were some reddish sputa thrown off by an occasional cough. The tongue was pale, but not white. Bronchial respiration was detected with the stethoscope.

Prescription: diet, venesection, gum water, purgative enema, and the following gargle:

℞. Sulph. aluminæ, grs. xxx.
Hydrochlor. acid, gtt. xv.
Mellis rosar. f. $\mathfrak{z}\text{j}$.
Aq. destillat. f. $\mathfrak{z}\text{jv}$. M.

During the course of the day, this gargle was occasionally injected by a syringe. The enema produced two good stools. There was cough, and mucous sputa were discharged through the canula.

At four in the evening, eight or ten insufflations were made with burnt alum: twenty-four doses of calomel, one grain each, were given at intervals of half an hour. Much mucus passed by the tube; respiration by the glottis was difficult; deglutition easy.

At six, no respiration could be effected when the tube was closed. The blood drawn in the morning was very serous; the coagulum small, and the buffy coat large. The venesection was repeated, and twelve ounces drawn; sinapisms were ordered to the legs.

31st of March, six in the morning. Twelve grains of calomel had been taken during the night; the gargle had been injected three times. He had a perfect calm, and prolonged periods of sleep until three, since which time respiration became anxious. The tube was free, but little air reached the lung: this would be called a *calm* spasm of the bronchia. The hand held before the tube perceived only a small short breath.

The pulse was lowered; f. $\mathfrak{z}\text{vii}$.j. of blood were drawn, which produced a sense of weakness; but respiration became easier as the blood flowed, and was more prolonged and deeper. The patient

expressed himself relieved; the pulse rose. Shortly after, there was a greenish *stercoral* evacuation, without the excretion of urine. Sinapisms to the feet and legs.

At seven o'clock he was calm, the respiration so feeble, that M. Ambrose Laennec no longer found the signs of bronchial catarrh; the sputa were white, spumous, and rather thin; they flowed from the mouth and tube: there was some cough. When the canula was stopped, the patient breathed through the glottis, but with difficulty and noise. Tongue white. Every spoonful of gum water produced cough, while the calomel was swallowed without difficulty. There was a slight pain in the abdomen.

Prescription: four spoonfuls of rice, (*crème de riz*), a cooked apple, gum water with an ounce of the syrup of opium, gentle enemata with half a dram of the tincture of musk, insufflation of alum, gargle of hydrochloric acid and honey of roses—continue the calomel.

The patient took the remaining twelve grains of calomel, and the opiate draught, the swallowing of which provoked a frequent cough, accompanied with white glutinous sputa that passed by the canula and mouth. Sometimes respiration was effected by the glottis, when the tube was closed; at others, suffocation would be produced by a continuance of the experiment. The enema was passed two hours after its application. The alum, which was frequently insufflated, only produced nausea. There was some quiet sleep,—once for four hours, with perspiration. The pulse was occasionally accelerated, but generally soft, and full enough to permit another bleeding, if the spasm should return.

Six o'clock, P. M. Since half past four, there have been two clear, greenish stools; perspiration, and frequent pulse. Twelve more doses of calomel, and the gargle.

℞. Infus. kino. f. ℥vj.
Acid. hydrochlor. gtt. xxx.
Mel. rosar. f. ℥j. M.

To be injected during the night.

April 1st, at seven o'clock in the morning. He had several hours sleep during the night. The twelve grains of calomel were taken. The abdomen is not so painful; no *ptyalism*; tongue white. Respiration painful when the tube was shut. We could not anticipate an early closure of the artificial opening. Inspiration was feeble in both lungs; there was mucous rattle in the large bronchia only; the sputa were less abundant; the cough less frequent: the blister on the neck still suppurated.

Prescription: rice, citric lemonade, gum water, one ounce of syrup of poppies: an injection of starch and poppies.

At two o'clock, respiration was difficult, spasmodic, and feeble; there was subsultus in the left arm. To lose eight ounces of blood, and take this julep:—

℞. Mucil. gum. acac. f ℥iij.
 Tr. moschi, gtt. x.
 Æther. sulphur. rectific. gtt. xx.
 Syrup. limon. f ℥ss. M.

Under this medication the dyspnœa ceased, and the inspirations were deeper.

At six in the evening there was an inclination to sleep. The sputa were less frequent.

At ten, continued drowsiness; the wound gaped when the tube was removed.

At eleven, there was a new fit of dyspnœa; the voice was free, although the air did not enter the lung. The pulse was hurried; the left arm agitated with convulsive movements. He could scarcely swallow a spoonful of the syrup of poppies prescribed in the morning; the spasm ceased, there was a deep inspiration; drowsiness soon returned.

April 2d, six, A. M., the dyspnœa continued; sudden spasm, and convulsive jerking of the arms. The night passed without any other accident than comatose stupor, from which the patient had to be roused to give him drinks and the gargle. He took two spoonfuls of gum water, with twenty drops of ether, and twelve of tincture of musk, which immediately relieved the spasm with a deep inspiration; he cried out, "I am again saved." Sinapisms to the feet; purgative enema.

At seven, there was mental excitation. The enema has just come away: no spasm: he wanted to sing to prove that he was better; but a moment afterwards he shut his eyes, and seemed drowsy.

At eight, delirium; all the mixture of ether and musk had been taken. The sinapisms were removed, and six leeches were applied to each jugular.

Prescription: diet, orangeade, gum water, with ether, twenty drops; tincture of squills, fifteen drops.

The artificial opening remained free without the canula, which was laid aside. No more expectoration; the blister was drying up. The patient sometimes seemed dull, and then the respiration was wholly suspended; sometimes there was a series of short inspirations and expirations consecutively, and followed by complete repose.

At ten, there was prostration, and the respiration was so weak that the breath could scarcely be felt by the hand.

At two, P. M. there was great alteration in the features; the eyes were glassy and half open; scarcely any respiration, except by fits; complete dyspnœa; pulse almost lost. Death at four.

Autopsy eighteen hours after death.—Flesh pale, the testicles scirrhus, lost in a white homogeneous tissue which had invaded the scrotum, and in which there were tubercles. The left lung was engorged. The stomach, intestines, liver and spleen, kidneys and bladder, were natural.

Larynx.—Thyroid body healthy; the mucous membrane, above

the epiglottis, pale; no false membrane; os hyoides healthy; nothing remarkable observed in the thyro-hyoid membrane; on its posterior margin there were two points ossified. Epiglottis pale, rather thickened; epiglottic membrane and gland natural. The aryteno-epiglottic ligaments swelled, and white, and infiltrated with a gelatinous, transparent, trembling substance, in which neither purulent infiltration nor vascular streaks were observed. This œdema, being larger on the left than on the right side, gave the left ligament a fusiform appearance. The superior vocal cords, white, large, and of similar but of rather harder consistence with the epiglottic ligaments; ventricles occluded by the tumefaction of the inferior vocal cords, which were white, hard, creaked under the knife, and pressed against one another; their tissue resembled that of the testicles, but they were not tuberculous. The mucous membrane of these organs was white and thickened: the sub-mucous cellular tissue was hypertrophied: the arytenoid cartilages healthy, but surrounded by hardened cellular tissue: the synovial membrane of the left crico-arytenoid cartilage had its natural aspect, but the right was black: the thyroid cartilage, the crico-thyroid membrane, and the ring of the cricoid cartilage, presented no alteration, but the whole of the left anterior face of the *chaton* was roughened by a black fœtid caries, the mucous membrane destroyed, its posterior face reduced to a thin lamina, and thrown back, still covered by muscles. The tissue of the crico-thyroid muscles was natural; the posterior and lateral crico-arytenoids did not appear altered, but their adherent face was blackened, and they were misplaced by the anomalous shape of the *chaton*. The thyro-arytenoids were partially altered, in the same way as the vocal cord. The arytenoid muscle is distinct, but very pale. Nothing else was observed in the larynx, except the remarkable discolouration of the mucous membrane.¹

"Although this autopsy has shown traces of chronic laryngitis, which had advanced to scirrhus of the inferior vocal cords, nevertheless, I think that the patient, who had long suffered from this disease, might have prolonged his existence if the œdematous laryngeal angina had not occurred; for, notwithstanding their degeneration, the vocal cords were firm, and the dilating muscles of the glottis could still separate them; but the œdema above being soft and moveable, acted as a valve to the passage of air, and was not subject to muscular action; the angina appeared after its development."

This case fully confirms our opinion respecting consecutive œdematous laryngeal angina.

The patient had fits of orthopnœa, his inspirations were more difficult than the expirations; the practitioner rightly diagnosticated an aryteno-epiglottic swelling, *an œdema of the glottis*. Had he been

¹ This and the anatomical alterations are very analogous to the history of M. S. of our obs. I.

satisfied with that, and acted accordingly, especially if he had made a sufficient opening to keep up respiration, he might have extended his patient's life; but unfortunately he could not trace what Bayle had said respecting that anatomical alteration without also recalling what he had said of the symptoms. The unfortunate patient had the somnolence which appertains to slow asphyxia, he felt choked, (for one cannot long breathe through a goose quill,) and instead of advertg to the small diameter of the tube, a *mild spasm of the bronchia* was invoked to account for death. Consequently, an *anti-spasmodic* draught was administered, and, as the patient said, *I am again saved*, after drinking it, the conclusion was drawn, that the medicine had *calmed the spasm*, whereas, the *ether and musk* being stimulant antispasmodics, enabled him to breathe for a few instants, which he did by long sighing inspirations, like an animal just relieved from a partial vacuum.

The same spirit presided at the autopsy: there was an unwillingness to see traces of inflammation in this *œdema of the glottis*. There were red points about the aryteno-epiglottic ligaments, and induration of the vocal cords; there was caries of the left side of the cricoid cartilage, corresponding to the principal œdema; and, moreover, there had been a permanent pain in the throat for seven months, still, with all these signs of inflammation, he was unwilling to acknowledge a phlegmasia.

God forbid, that we should wish to impute blame to the conduct of the physicians who treated the patient! our remarks are only intended to show the unfortunate result of a false explanation of symptoms, and, at the same time, to establish the generally inflammatory character of consecutive laryngeal angina, and especially in the case under consideration.

We should say Captain Barbe died of simple chronic laryngeal phthisis, which caused inflammatory engorgement of the mucous membrane of the larynx, and, consequently, death by asphyxia, which is a frequent termination of laryngeal phthisis.

OBSERVATION XXXI.

Chronic laryngeal angina—Threatened suffocation—Tracheotomy—Death during the operation—Ulcerations of the larynx—œdema and induration of the lips of the glottis—Crude tubercles in the lungs.

A porter, aged fifty-two years, large, spare, and otherwise of a good constitution, and without any of the rational signs of pulmonary phthisis, entered the Hôtel-Dieu, in the course of November, 1834. He complained of his voice having been gradually changing for thirteen months; for the last six weeks, after being hoarser, it was almost lost. Respiration became difficult, inspiration was laborious and hissing, expiration required the aid of the diaphragm; incessant orthopnœa, awaking with starts, and painful deglutition soon followed, with so great dysphagia that the patient could not lie down, nor swallow a few drops of soup without great pain.

By passing the finger to the opening of the larynx, a decided swelling was felt; pressure on the hyoid region externally was painful; the patient coughed without spitting. No pulmonary lesion was detected by the stethoscope or by percussion.

As he had previously had chancres, an antisiphilic course was pursued. During its exhibition, the symptoms seemed to yield a little; but they soon reappeared with such alarming threatenings of asphyxia, that tracheotomy seemed the only resource.

So soon as this determination was communicated to the patient he entreated us not to defer it, "that he should die suffocated, if we did not soon make him breathe." We yielded to such an energetic appeal, as well as to the urgency of the indication, and arranged every thing for the operation. The patient seated himself courageously, and was surrounded by a great many pupils.¹

The patient had syncope and some convulsive movements as soon as the bistoury had divided the skin, and before a drop of blood had flowed. He recovered in two minutes; the operation was resumed; syncope and convulsions recurred, and the respiratory movement entirely ceased. The patient was carried to a bed where the trachea was immediately opened; syncope continued. The blood flowed guttatim from the thyroid veins into the air passages, which were filled without any expiratory effort, except the spasms of death. The body was placed on the side to favour regurgitation, and the blood was drawn off by means of a sound—but the patient was dead.

At the autopsy, the epiglottis was found much swollen; there were many deep ulcerations and a considerable œdematous and scirrhus swelling at the lips of the glottis, which almost occluded its opening. This tumefaction, which extended to the neighbouring tissues, was remarkably diminished towards the lower part of the pharynx and upper extremity of the œsophagus. Some crude tubercles were scattered through the lungs.

In this case the tubercular affection followed the disease of the larynx, for the tubercles were crude while the disease was of thirteen months' standing. The patient was suffocated by the inflammatory swelling of the walls of the larynx before the pulmonary affection could have induced the termination of his mortal existence.

¹ We here committed a great error in not making him lie down, the proper posture for all grand operations. Had we attended to this axiom, it is probable we should not have lost our patient. But a worse mistake was continuing the operation after the first stroke of the bistoury had caused syncope and convulsions. We have performed the operation seventy-eight times, and this is the only patient we have ever lost during the operation.

OBSERVATION XXXII¹

Supposed to have had asthma for a long while—Sudden death—Ulceration of the mucous membrane of the larynx and upper part of the trachea—Larynx filled by a mass of concrete pus.

"Virgo igitur, de quâ modo dicebam, annos nata ad quadraginta, jam diù asthmatica, imminutâ insuper voce, à medicis procul dubio ex pulmonibus laborare credebatur, cùm, acriùs asthmate ingruente, de improvviso mortua est, et ab studiosis adolescentibus in Bononiense anatomicum theatrum illata anno 1704. Ventris viscera nihil quod præter naturam esset, habuerunt, si paulò majores testes excipias duros, albos, prorsùs skirrhosos, quibus hydatides aliquot incumbabant. In thorace autem ipsisque pulmonibus nihil omninò vitii; ut jam omnes intra cranium morbi causam repertum iri putarent. Sed et ibi rectè constituta inventa sunt omnia. Mirabantur cuncti qui dissecta ex ordine viscera diligenter inspexerant; sed muttò nos magis qui disseccueramus; cùm ego: 'Quin laryngem quoque aperimus, Valsalva? Si fortè et imminutæ vocis, et asthmatis et mortis causa ibi delitesceret?'

"Cùm ille annuisset, quæri continuò inter nondùm sepultas partes, et ad me referri laryngem, jussi. Quam ubi à tergo secundum longitudinem incisam, diduxi, continuò manifestum fuit quod quærebamus. Pus enim ex albo cinereum, et quasi pultaceum, formatum in obturamenti modum, occludebat penitùs cavum laryngis quod infra glottidem est: eoque loco tunica laryngem convestiens erat exulcerata, quemadmodùm et quâ proximos annulos aliquot tracheæ arteriæ operiebat, quanquam hic leviùs.

"Quibus postremo anatomes die in theatro demonstratis, satis omnibus factum est."

OBSERVATION XXXIII.²

N***, thirty-six years old, of a robust constitution; at thirty-two she became a dealer in clothes and rags. Some time after, she experienced a small, dry cough, with pains in the larynx and difficulty of breathing when she went up stairs. The sound of her voice became sharp, the cough was accompanied with expectoration of grayish insipid sputa; general and fitful rigours were felt after eating.

Three years from the commencement of the disease, and six months before death, the symptoms were remarkably exasperated. The larynx became sensitive to the touch, and emitted a noise like burnt paper crushed in the hand. There was much pain in the chest, heat in the palms of the hands, and all the other symptoms of pulmonary phthisis. She died after four years' illness.

Autopsy.—The lungs were adherent to the ribs, and contained

¹ Morgagni, *De sed. et c. morb.* vol. ii. lib. 2, epist. 15, art. 13.

² Extracted from the Thesis of M. Laiglelet.

many whitish, miliary tubercles, some of which had begun to suppurate.

The laryngeal affection *was more advanced*; the parts were more deeply ulcerated; the right arytenoid was almost entirely destroyed, and converted into a soft matter like that often found in white swellings. The left arytenoid was surrounded by a number of fungous excrescences.

OBSERVATION XXXIII. bis.

Acute laryngitis become chronic—Tracheotomy—Cure—Return of symptoms—Death—Tubercles succeeding the laryngitis.

Dr. Buillard published, in 1829, a *case of croup in an adult*, in which he was forced to practise laryngo-tracheotomy. We shall give a succinct summary as follows:—

Antoine, aged twenty-six, employed in the custom house, of a sanguineo-bilious temperament, of a very irascible character, and of irregular habits, was sent an exile to Stutzelbronn, a marshy country, surrounded by dense forests.

In 1824 he had a catarrh, which left him weak and emaciated; still he resumed his post on the 20th of November; his voice was altered, he had great oppression, and some fits of orthopnœa, which were at first calmed by a slight antiphlogistic treatment, and on the 2d of December there was only an alteration of the voice, which had become shrill and squeaking.

But on the evening of the same day the symptoms reappeared with new intensity, and with such rapidity that, on the next day, suffocation was imminent, and M. Bulliard practised laryngo-tracheotomy.

Some slight symptoms ensued from the operation and from the presence of the canula, but gradually disappeared. Respiration was completely established by the canula; but when the orifice was closed it was performed through the larynx with the greatest difficulty.

20th June, 1825, six months after the operation, the respiration continued the same; when the canula was closed the voice was hoarse, convulsive, low, not sustained, and requiring great efforts on the part of the inspiratory muscles. In other respects the general health was pretty good. The patient had recovered his strength and embonpoint.

A consultation was held between MM. Bulliard, Caillot, dean of the faculty of Strasbourg, Tourdes, Lobstein, and Coze. It was agreed:—

1st. That the laryngeal region offered nothing remarkable externally; 2d. That the obstruction to the passage of air through the upper part of the larynx might depend upon thickening of the mucous membrane, or upon œdema of the glottis; finally, that the

presence of the canula excited in the lungs, (*otherwise healthy*), an abundant opaque secretion.

Pills of calomel, golden sulphuret of antimony, and extract of cicuta were prescribed; also, frictions of hydriodate of potassa to the neck. The patient was somewhat relieved.

On the 10th of January, 1826, he entered the hospital of Bitché, with deep pains in the lungs, night sweats, diarrhœa, and all the symptoms of advanced phthisis. He refused all aids, and died on the 7th of March following, fifteen months and four days after the operation.

Necropsy.—The small intestines were ulcerated in many points. The two pleuræ were adherent to the walls of the thorax; that of the left side contained about a pound and a half of serum. The lungs were hepatised at their base. There were a great many tubercles at the summits, some of which were softened.

The bronchial ganglia, near the bifurcation of the trachea, were much swollen, and passing into the melanotic condition.

The artificial opening of the trachea was invested with a sort of mucous membrane, which seemed formed by an alteration of the skin.

The glottis was narrowed, and the ventricles of the larynx less extended than natural. The larynx offered no trace of œdema, or membranous productions.

This is a very interesting case, but we cannot agree with its author in considering it a case of croup in an adult. The symptoms first experienced were like those mentioned by Boerhaave as belonging to acute laryngeal angina, (aphor. 802.) The shreds of false membrane which the patient expectorated, were not described with sufficient perspicacity for us to recognise them positively; although of the nature of an inflammation, the first attack had passed over, and we find the larynx the seat of an inflammation, which, on the fifteenth day, required tracheotomy. The general symptoms were reduced, but the disease became chronic. The patient had an obstinate unconquerable cough, and finally died with numerous suppurated tubercles, eight months after experienced physicians had decided that the lungs offered no organic lesion, and fifteen months after the invasion of the laryngeal inflammation.

This case and the preceding, with No. XVIII, are additional proofs to those who believe that laryngeal phthisis may precede, not occasion pulmonary phthisis.

CHAPTER VII.

TREATMENT.

As the ancients possessed a very limited knowledge of these diseases we should not anticipate deriving much information respecting the treatment from a perusal of their writings. All that we do find, relates to cases of acute laryngeal angina the extreme danger of which they well knew. Therefore we shall not dwell upon their curative means, as most of them would be of little avail in chronic diseases of the larynx, but they will be noticed in the course of the chapter as occasion may offer.

In the management of disease, we should study the treatment of the first symptoms with as much solicitude as that to be opposed when the malady has been fully developed.

But, as laryngeal phthisis generally commences by a slight affection which becomes chronic, we must here attack this minor affection, which may generally be controlled by such treatment as is commonly applied to a common catarrh.

But when the inflammation instead of yielding seems to increase from day to day, when the hoarseness and aphonia continue, and when the cough assumes the characters we have described in the chapter on symptoms, it becomes necessary to have recourse to the energetic medications, to which we shall devote a few pages.

Rest of the organ.—Rest is the most indispensable adjuvant in the treatment of laryngeal diseases. It is evident that when the glottis is in constant motion from the act of phonation, and incessantly agitated by the vibrations of air, it cannot be easily cured. The patients should speak in an under tone,¹ or even content themselves with writing on a slate. Experience has taught us that no inconvenience arises from speaking in this manner, although the patients sometimes make great efforts to render themselves more intelligible to their hearers.

All physicians who have treated these diseases know the difficulty of obtaining this state of rest. There are few patients whose social relations will allow them to be condemned to silence for several months.

It is not impossible to cure serious affections of the larynx without enforcing this hygienic rule, as may be proved by many facts we can adduce.

Antiphlogistics.—Bloodletting and emollients are, perhaps, improperly ranked among the most powerful agents for combating the early stages of laryngeal phthisis. We cannot tell why one

¹ By *under tone* (*voix basse*) we mean the voice that is not fully developed, and consequently *insonorous*, (*insonore*), if we may be allowed so inexact an expression.

mode of drawing blood should be preferred to another ; but in this case, facts have taught us that venesection from the arm generally gives more favourable results than the application of leeches near the seat of the disease, at least when they are not *freely used*. Cut cups applied to the nucha are beneficial, but inferior to the other methods.

The peculiarities of the case should teach the physician when to prefer any one mode ; thus, he may sometimes choose to apply leeches to the thighs, when the disease coincides with suppression or diminution of the menses ; to the anus, when hemorrhoids have been suppressed prior to the inflammation in the larynx. He must seize these and other indications, which we shall not mention, because they apply to every chronic phlegmasia, as well as to simple laryngeal phthisis.

Emollients should not be incautiously prescribed ; internally they produce no inconvenience, but, the external application of hot poultices, advised by most physicians, frequently produces an opposite effect to that anticipated ; it provokes a considerable flow of blood towards the throat, and the symptoms, instead of being subdued, are often greatly aggravated.

Revulsives.—Revulsives are more important in laryngeal phthisis than emissions of blood, the latter being temporary in their effects, while the former are more lasting, and their action should be long continued ; for this reason we regard transient blisters as wholly useless, at least unsuited to meet an accidental and somewhat acute symptom. Permanent blisters, placed in front of the neck cause such acute pain, that those of our patients to whom we advised them, were obliged to lay them aside. In men particularly, the beard was an obstacle against which it was difficult to guard. We therefore generally placed the permanent blister upon the nucha. But if the patient will submit to the seton we always prefer it as being less painful, less irritating, and less difficult to dress.

The seton, placed in front of the larynx, about opposite the cricothyroid space, occasionally produced happy results, when that on the nucha seemed adding to the difficulty.

Antimonial frictions and caustic potash are the revulsives to which patients object least, and which we ordinarily employ, without, however, deriving any very good effects from them. The antimonial frictions should be continued for some days, and not laid aside when the pustules first appear, but should be persisted in one or two days longer, until the eruption be confluent. Then again, when the scab begins to fall, the ointment should be resumed, and so twice a month while the disease lasts.

We generally direct a small piece of the caustic potash to be applied once a week, on either side of the larynx and trachea, in this way we get five or six canterised surfaces suppurating at the same time without the necessity of inserting peas to keep them open. We

have much less confidence in revulsives when they are applied at a distance from the diseased organ.

Opiates.—Many facts prove that pain, although often caused by the inflammatory afflux of liquids, may perhaps cause inflammation itself, or at least congestion. Hence it is important to calm it by opiates both internally and externally. They should also be considered in another point of view, they calm the cough, which is a very important object to effect when inflammation or ulceration exists in the larynx. External applications generally suffice to calm the local pains.

Among them the most powerful are the extracts of stramonium, the extract of belladonna, which is similar, and the salts of morphine, which should always be applied to a vesicated surface.

Bennati has particularly extolled the topical application of opiates.

He made repeated frictions of belladonna in front of the neck. This article, which is decidedly useful when there is much pain, and when used in the beginning of the disease, is not so important as the author represents it, when the disease is confirmed and when there is no local pain.

M. Cruveilhier, in similar cases, and to answer the same indication, has directed the patient to smoke the leaves of datura stramonium or of belladonna, which had been boiled in a solution of opium and afterwards dried. This calms the cough in most cases, and may in that way assist in effecting a cure.

We now come to another class of remedies which are much more efficacious.

Topical medication.—When a simple or ulcerative inflammation has become chronic, and occupies but a small point in the economy, it generally resists even the most thorough general treatment. On the contrary, topical medication or the direct application of medicines to the injured part, almost always modifies it. Thus the most obstinate ulcers of the throat, nose, eyes, skin, vagina, rectum, &c. &c. are generally controlled by topical applications made to their surface. These are either emollient, detergent, or irritating, and sometimes destroy the surface of the lesion. They are either pulverulent, liquid, gaseous, vapoury, or solid.

The only difficulty consists in the anatomical relations of the parts, the action of the remedies being the same internally as externally.

If then we can find a method of treating the larynx by topical remedies, as we do the canal of the urethra, we shall open a new therapeutic avenue to laryngeal affections, and render them curable.

We do not deny that the functional importance of the organ opposes new difficulties, but we have been able to accommodate our applications to respiration, and have used some new remedies and obtained results to which we wish to call the reader's attention.

This is the problem to be solved; *To ascertain a method of bringing medications in form of vapour, powder, or liquid, in contact with the mucous membrane of the larynx without interrupting respiration.* We think we have succeeded in effecting this object.

Inspirations of dry or moist vapour.—Various fumigations have been prescribed for laryngeal phthisis and other affections of the respiratory organs. The most common were vapour of water, either pure, or impregnated with emollient, balsamic, or aromatic substances; sometimes dry vapours were used, as those of pitch, resin, henbane, tobacco, and poppy. Messrs. Cottereau, Gannal, Richard, and ourselves, have invented various forms of apparatus for this purpose, but we frankly confess that a simple teapot is as well adapted to the purpose as the most complicated machines.

The moist fumigations may be charged with volatile matters, as chlorine, iodine, hydro-sulphuric acid or the various essential oils, which are not indeed without their specific action on the mucous membrane of the air passages, as has been proved by the experiments of M. Gannal, Cottereau, &c.

We have even made our patients inspire fumigations of cinnabar, sulphurous acid, &c. &c., with various results. All these applications have the serious inconvenience of not being confined to the larynx, but coming in contact with the pulmonary mucous membrane, which they irritate exceedingly, and it is impossible to confine their action to the diseased organ; this is the reason we have renounced their use. We now employ nothing but emollient, aromatic, balsamic, and opiate vapours, and such as can exert no unfavourable influence upon the lungs.

Liquid medications.—Liquids are much more easily applied, and without risk of injuring the trachea and bronchia. We have used those that are irritating, and others simply astringent. The former are solutions of nitrate of silver, of corrosive sublimate, sulphate of copper, and nitrate of mercury; but the first we decidedly prefer on account of its rapid action, its harmlessness, and its efficacy in almost all external maladies.

We use it of various strength; sometimes we put a dram of the nitrate to two drams of water, sometimes half this strength.

Various methods have been devised to apply the caustic to the larynx: when we wish to operate upon the upper part of the larynx and the epiglottis, we take a piece of paper firmly rolled together, and bent at its extremity, which is to be soaked in the solution, so as to take up at least a drop; the mouth is to be opened, and the tongue depressed with the handle of a crooked spoon. The porte caustic is then introduced, and when its extremity has passed the epiglottis, it is to be depressed, which buries it in the upper part of the larynx. A piece of whalebone answers the same indication, and is more convenient, because less flexible than the rolled paper.

When we wish to cauterise the pharynx, the base of the tongue, and the top of the larynx at the same time, we take a whalebone,

at least a line and a half thick, that it may not bend readily ;—this is heated an inch or more from one end, and, when sufficiently softened, we curve it at an angle of forty-five degrees. To this end, we fasten a spherical piece of sponge, six lines in diameter : the sponge is to be moistened with a solution of nitrate of silver, the mouth opened, and the tongue depressed as before. When the isthmus of the gullet is passed, there occurs an effort of deglutition which elevates the larynx, and we seize this opportunity to draw forward the sponge, which had been at the entrance of the œsophagus. By this manœuvre we get at the glottis, and then it is easy to express the solution into the larynx : the cough, which now occurs, favours the introduction of the caustic. The operation often excites vomiting.

This plan, though not painful, is very disagreeable, and many patients refuse to submit a second time. We then use the following, which is equally efficacious, and less unpleasant.

It consists of a small silver syringe, like Anel's, with a tube five inches long, and curved at the end. The opening of the tube should be at least a quarter of a line in diameter. The syringe is filled to one-fourth of its capacity, and then the piston is raised to its full extent, so that there shall be one quarter solution, and three quarters of air in the instrument. This is indispensable, that when we depress the piston rapidly, we may produce a fine shower, and not a full jet.

The patient is placed as before ; and, when the end of the tube has passed the epiglottis, the liquid is pushed out of the instrument, and is simultaneously introduced into the larynx and upper part of the œsophagus. The patient instantly experiences a convulsive cough and regurgitations, which enable him to throw off all the solution which is uncombined with the tissues. We then make him drink a few mouthfuls of hydrochloric lemonade, or simple salt water, to decompose any of the solution that may have remained in the œsophagus.

One must have practised, or seen these cauteries performed, to have an idea of their harmlessness, and of the little pain which results. We are very much afraid of cauterization, for it is exceedingly painful on the skin or mucous openings, though scarcely felt in the pharynx, larynx, or neck of the uterus. We must not confound the organic sensibility of the larynx that sympathetically causes the cough, with the animal sensibility of this organ, which is extremely obtuse.

We shall furnish some cases that show the utility of cauterising the larynx in the first stage of laryngeal phthisis.

OBSERVATION XXXIV.

A slight chronic laryngitis.—Aphonia gradually developed in a young girl of a tuberculous family.—Cauterisation of the upper part of the larynx.—Rapid convalescence.

Miss Héloïse G——, of Bapaume, was the youngest child of a mother who died of phthisis. She had come to Paris at thirteen years of age.

Her infancy had been delicate ; but she had never spat any blood, nor was she particularly liable to take cold. Shortly after her arrival here, she experienced, almost every month, an erythema of her face, which lasted two or three days, and was accompanied with fever. This we attributed to the approach of the catamenia : we merely directed our attention to this point, and the discharge was established at the age of fourteen.

From this period, the congestion about the face was only observed once, when it resembled erysipelas, and lasted two days. The following month the discharge did not appear, but a cold she had had three months, grew rather worse ; the voice became hoarse, and was at length completely lost. The family were greatly alarmed ; indeed, the hereditary predisposition offered great cause. We made a most careful examination of the thorax, without finding any signs of tubercles. There was no pain in the larynx ; the pharynx was red, and rather painful.

Antiphlogistics and emollients were first employed, then gargles of alum, and syrup of *erysimum* :¹ but without avail. As there was no pain, we resolved to introduce the solution of nitrate of silver, fifteen grains to two drams of distilled water. The larynx was touched with a little roll of paper, according to the plan mentioned above ; at first, it was applied every day, then twice a week. After the second application, some hoarse sounds were produced during the day : after the third, the aphonia ceased, but the voice was still cracked : it acquired its natural character after the eighth application, and the cure was established.

¹ This is the *Erysimum officinale* of Linnæus, which has been considered officinal in the United States Dispensatory, under the name of *Sisymbrium officinale* :—"A small annual plant, growing both in the United States and in Europe, along the roadsides, by walls and hedges, and on heaps of rubbish. It has an herbaceous, somewhat acrid taste, which is strongest in the tops and flower spikes, and resembles that of mustard, only much weaker. The seeds have considerable pungency. The herb is said to be diuretic and expectorant, and has been recommended in chronic coughs, hoarseness, and ulceration of the mouth and fauces. The juice of the plant may be used mixed with honey or sugar, or the seeds may be taken in substance."—*Tr.*

OBSERVATION XXXV.

Slight chronic laryngitis.—Sudden appearance of aphonia, which continued three months.—Cauterisation of the throat.—Cure effected on the fourth day.

Henrietta Maillet, aged twenty years, entered Hôtel-Dieu on the 20th of August, 1831. She had menstruated at seventeen, but it has always been irregular, and small. In 1830, she had an inflammation of the lungs, which was completely cured. The lungs and heart were in the most healthy condition. She never had hæmoptysis, nor any symptom of hysteria.

The affection for which we treated her had existed three months. In the end of May, while menstruating, she joined a party to the country, and took cold. At night she went to bed with a sore throat, and general uneasiness, but rested pretty well: in the morning, she found her menstrual discharge suppressed, and that she had complete aphonia. From that time, no treatment relieved the loss of voice, and she could not produce any sounds above a whisper.

A physician had been called, who bled her twice without any effect. Two months afterwards, as the menses did not return, leeches were applied to the anus. The aphonia was not at all relieved, although menstruation was established. Still, the larynx was not painful; there was neither cough nor fever. A large blister was applied to the front of the neck, and kept suppurating for a long while; but this also failed, and Henrietta came to the hospital in despair. The menses had made their regular appearance a few days previously, but her disease was no better.

We thought syncope might produce a happy effect, as it sometimes does in cases of hysterical aphonia; to produce lipothymia, we bled her sitting in a chair. Syncope followed, but without any advantageous results: it was only observed that she uttered a sharp cry at the moment the lancet pierced the integuments.

We watched the effect of the venesection two days, it proved as unsuccessful as heretofore.

It occurred to us to apply rubefacients to the skin of the neck, as we had known a case cured by a sinapism to the larynx, but were deterred by the want of success that had attended the blister. Topical medication appeared preferable to any other, and we resolved to cauterise the pharynx and upper part of the larynx.

The operation lasted but a quarter of a minute; we withdrew the sponge, and convulsive movements, cough, and frequent spitting immediately ensued, but ceased after two or three minutes, except some cough and spitting. The patient did not feel any acute pain in the throat, but complained of a disagreeable taste.

The next day there was no change; she had some pain on swallowing. Forty-eight hours after the operation the aphonia had

partially disappeared, the patient spoke clearly. When we interrogated her, she said she was better, and spoke hoarsely but with sufficient distinctness to be heard at a distance of two or three yards; she afterwards became aphonic, and only a hissing was heard in the larynx when she made great efforts; she had a slight pain in the throat.

We directed absolute silence and prescribed an emollient draught to be taken frequently in small quantities.

On the morning of the third day, the voice was much clearer than it had been. In the evening she could pronounce some sounds quite distinctly.

On the fourth day she spoke with facility; the aphonia had completely yielded, and did not return: the voice was only a little cracked, and the larynx was occasionally obstructed by mucus which was thrown off by coughing.

The fifth day, the voice was clearer and louder, the pain of the cautery was still felt about the larynx, but it was slight and did not prevent her eating bread and solid food. The voice soon recovered its natural character, and Henrietta Maillet left the hospital on the 10th of September, perfectly cured, but feeling a very slight pain at the point corresponding to the upper part of the larynx.

OBSERVATION XXXVI.

Chronic laryngitis of three months' standing, with aphonia that appeared suddenly with a cold.—Cautery of the throat.—Cure on the third day.

A woman thirty-seven years old, came to the Hôtel-Dieu, to be treated for an aphonia which had lasted three months—she had had an acute catarrh, with scarcely any fever, a short time before. A fortnight after the commencement of the catarrh, the voice was suddenly lost, and has never since returned, although the cold has completely disappeared. We explored the chest with great care, but could discover no traces of pulmonic lesion. The larynx was neither swelled nor painful, the tonsils looked natural, and the menstruation was regular. We immediately used the cautery; she improved, and three days afterward the voice was restored. She continued in the hospital some time without having a relapse.

OBSERVATION XXXVII.

Chronic laryngitis for several years.—Gradual appearance of aphonia in the course of a chronic catarrh.—Cauterisation of the throat.—Cure in one month.

This patient was forty-three years old. For a long time she had been subject to a bronchial catarrh which returned every winter, and lasted until spring. She was a shopkeeper in the Temple, and was constantly exposed to the air under a penthouse which

was her shop; and she was obliged to speak loudly. Her voice insensibly changed its volume, and finally she became completely aphonic in March 1831, after a catarrh which had lasted several months. At first she did not mind it much, but finding it did not improve, she consulted several physicians, who all prescribed blood-letting and revulsives. At last, she became weary of the fruitless attempts, and determined to enter the royal Maison de Santé. Professor Dumeril asked us to visit her: he had applied a large blister to the front of the neck, and prescribed a mild regimen.

When we first saw the patient, her face presented the appearance of perfect health. The encephalic and abdominal organs performed their functions well. There was no fever, the chest sounded well. There was cough and rather abundant mucous expectoration, nothing induced a suspicion of tubercular phthisis. In deglutition there was an obstruction (*embarras*) rather than pain in the region of the larynx. When the patient made great efforts to speak, her voice was low, but when she was excited and tried hard to produce some vocal sound, occasional hissings were heard.

Although we entertained little hope of effecting a cure, we nevertheless, resolved to try one thing which we considered wholly free from danger, and not very painful. We cauterised the upper part of the larynx.

This operation did not occupy a quarter of a minute, we withdrew the sponge and hiccough immediately followed, with vomiting and an uncontrollable cough, which lasted nearly a quarter of an hour: When the cough and vomiting had moderated, we asked if the operation had caused her any pain, she answered, *with a hoarse but strong voice*, that she had suffered very little; and that she was astonished at the change in her voice. "It has been eight months," she said, "since I have done as much." We enjoined silence, and directed the alum gargle. The hiccough and nausea returned at intervals until the next morning, and the pain in the throat, inseparable from the operation, continued during the second day, still it was not so great as to prevent drinking and eating soups.

The aphonia was not improved; we vainly hoped that it would diminish in a few days, if not immediately after the cauterisation. She left the house in ten days.

Soon afterwards she came to see us and entreated us to make another trial, saying it was the only thing that had made her speak at all, and that she hoped much from a second application.

We were of the same mind, and went to her house with M. Professor Bouillaud, and cauterised a second time with a saturated solution of nitrate of silver; but we used a larger sponge and so much liquid that a very slight compression would easily squeeze out ten drops. Thus, though the patient had prepared herself she could not bear the introduction into the larynx, and by a convulsive cough, she threw so large a quantity of the caustic solution into our face, that it was covered with black spots for several days.

Immediately after the operation, the pharynx, tongue, and all the buccal mucous membrane were of a milky whiteness; a violent cough and vomiting immediately ensued, and the latter continued for twenty-four hours whenever the patient drank any thing: still, the parts were scarcely painful: there was neither fever, pain in the stomach, nor loss of appetite; all the functions were natural.

This time she did not speak immediately after the operation. Forty-eight hours after she breakfasted on oysters and bread, without feeling any other inconvenience than a slight difficulty of deglutition. Her voice was not restored, but she produced some obscure sounds with great effort. The cough was more frequent, expectoration more abundant. We prescribed a gargle of saturated solution of alum and vinegar, to be used eight or ten times a day.

Twelve days passed in this way, during which the cough continued obstinate and the expectoration abundant; occasionally when there was some respite from the cough, she articulated a few words in a hoarse voice.

Thirteen days after the second cauterisation, while supping with her husband and shop girl, she spoke for some minutes, and the aphonia did not again recur.

The voice, at first hoarse and sharp, became clearer, though, if she walked too long, spoke much, or exposed herself to cold, it would become hoarse but not aphonous. To conclude, the character of her voice is still much altered, but it is as good as it has been for several years.

OBSERVATION XXXVIII.

A cold followed by hoarseness—Fatiguing cough—Emaciation—Exacerbations of fever at night—Good thorax—No benefit derived from an emollient treatment—Repeated cautery with nitrate of silver—Cure.

Miss T. is twenty years old, a native of Madras, but resident of Paris since her sixth year. She had always enjoyed good health, none of her family have had disease of the lungs; her mother, who is still young, has had her hand much deformed by the gout.

About the middle of the summer of 1834 Miss T. caught a slight cold, after which she had frequent cough, with a sense of pain in the region of the larynx. During the winter the cough increased, and the voice was cracked.

In the spring of 1835 she had fever every evening; she became thin, and the cough returned both night and day, so as almost to deprive her of sleep. She lost her appetite, and although there was no expectoration, and the sound of the voice and respiratory murmur were natural, we could not help anticipating great disturbance.

Dr. Lebreton, her physician, prescribed fumigations, which afforded no relief. The mildest and most soothing regimen, with the use of asses' milk, effected nothing. She was sent to Enghien, to drink the waters, where her health improved a little, and she

returned without fever; but as the cough continued, though somewhat diminished, and as the throat and larynx were the seat of acute pain, the patient was placed under our care in the beginning of October, 1835.

The tonsils were somewhat tumefied, the veil of the palate swelled, the uvula prolapsed and œdematous, the larynx was painful, especially when the patient spoke loud, and the voice became hoarser at night, and in a warm room.

We first recommended frictions of the extract of stramonium to the front of the neck, and insufflations of the subnitrate of bismuth. These measures calmed the cough a little. We substituted for the bismuth a powder, of one part acetate of lead, and seven of sugar candy. After using these for a fortnight, as there was no melioration, we commenced with the nitrate of silver, and touched the tonsils and uvula with the lunar caustic.

In three weeks the cough and tumefaction of the tonsils entirely disappeared, and the swelling of the uvula was diminished. But as the superior region of the larynx was still rather painful, we resolved to apply the solution of half a dram of the nitrate of silver in two drams of water, to the epiglottis and upper opening of the larynx. This operation was repeated every fourth day for six weeks. The voice was completely restored, the cough ceased, the general health improved; the pain in the larynx occasionally returned when she spoke too much, or when she went to a ball where the temperature was elevated.

The treatment was continued longer than would have been necessary had she been willing to submit to speaking low, but it was impossible to restrain her from talking so much that we expect she will have a relapse.

OBSERVATION XXXIX.

Hoarseness for four years—Waters of Mont-d'Or—Improvement—Relapse—Same modification without success—Various other measures equally inefficient—Dry cough—Aphonia—Emaciation—Alum gargles—Cauterisation with nitrate of silver—Cure.

Madam G. twenty-five years old, of a family with good chests, has never had a bad cold nor hæmoptysis. In 1827, when first enceinte, Dr. Lebreton, her physician and accoucheur, observed that her voice was a little cracked; there was no pain in the larynx. From this period until 1832 the character of her voice continued to diminish, and she was sent to drink the waters of Mont-d'Or, which were beneficial. The next winter the symptoms were aggravated, and in August, 1833, she returned to Mont-d'Or, but without deriving any advantage.

At the commencement of 1834 there was a consultation of the leading physicians of Paris, who directed a mild regimen and asses' milk, at the same time they enjoined a low tone of voice. These

instructions were closely followed for six months without any beneficial result.

Small blisters were then applied to the neck, and renewed every other day for about five weeks, while the patient used gargles of decoction of pomegranate bark, tisans of florentine iris, and Baréges baths.¹ The baths seemed to improve the general health, but the larynx continued diseased.

In the month of February we were called in consultation with MM. Lebreton and Jules Cloquet. The voice was extinct, the patient could only produce a few hoarse sounds with great exertion. The larynx was not painful. There was neither swelling nor redness in the pharynx. Habitual cough, without expectoration.

Auscultation and percussion did not lead us to suspect tubercular lesion in the lungs, but there was decided emaciation, the general health was bad, and we feared the development of the worst symptoms. It was unanimously decided:

1st. That gargles of a saturated solution of alum should be used exclusively.

2d. That every week the tonsils and upper part of the larynx should be touched with a solution of half a dram of nitrate of silver to two drams of distilled water.

3d. That she should take half a glass of Bonnes water, morning and night.

Under the influence of this treatment, which was continued two months, the voice became fuller, and the general health was sensibly improved. She then went to the country, with directions to make insufflations with powdered alum, and occasionally with calomel one part, and candied sugar seven parts.

At the same time we prescribed the following vocal exercise:—Madame G. was to speak habitually in an under tone. Three times a day she was to read slowly, but aloud, for five minutes.

Three months after her arrival at Burgundy she considered herself cured. She resumed her former habits and conversed freely, always avoiding the open air and evening exposure. Her general health was excellent; the cough had entirely ceased.

In January, 1836, she took cold, which was followed by hoarseness for some weeks.

April, 1837. For three months, after a violent cold, the voice has again been very hoarse; but she was unwilling to sacrifice pleasure to health, and waited for fair weather to place herself again under our care.

The treatment is not always successful, as will be seen by the three next cases, which show that we may improve some symptoms without effecting a complete cure.

¹ *Sulphurous Baréges Baths.*

℞. Sulphureti potassæ ℥iv.
Aquæ communis ℔cc. M.

OBSERVATION XL.

Simple chronic laryngitis, lasting three years—Four applications of the cauterium in three months—Decided melioration—Treatment laid aside, return of the symptoms—Probability of tubercles.

Madame V., aged twenty-four, was a woman of active mind and great nervous susceptibility, who enjoyed general good health. She was an excellent musician. Every morning when she awoke she had a violent pain in the throat, which hindered deglutition, but insensibly disappeared in a few hours. She perceived with mortification that her voice had lost its clear sound and power.

On the 1st of August, 1835, we practised a first cauterisation of the pharynx and larynx, with a solution of the nitrate of silver (one dram to the ounce.) The operation caused such violent nausea and vomiting, that, disgusted with the remedy, she renounced all hope of recovering her voice. We prescribed a gargle of one ounce of alum to two pounds of water.

In a few days she begged us to repeat the cautery; her voice was already stronger, and had gained a note. Wishing the first application to have its full effect, we waited until the third week had elapsed before we repeated it. The nausea was less troublesome, and the voice was somewhat improved. The cautery was twice practised at intervals of three weeks, and the voice could reach *fa*. A severe cold, subsequent to a chill, forced us to suspend the treatment, to the great regret of the patient, who waited impatiently for its resumption, hoping to obtain the desired object.

But the cold took an alarming form; unequivocal signs of pulmonary tuberculation were manifested, and the voice was again altered; we did not feel justified in having recourse to the remedy which had before succeeded so well.

Our readers will remark that the cautery of the larynx effected a decided improvement, though the tubercular diathesis probably existed from the first. The same remark will hold in the next two observations.

OBSERVATION XLI.

Aphonia gradually developed in the course of a chronic inflammation of the larynx—Cautery of the throat—Unsuccessful.

A young woman of twenty, with a sanguine temperament, entered the royal hospital of faubourg Saint Denis, to be treated for chronic aphonia of several months' standing. She was placed under the care of Professor Duméril, who called us in to the case. She had the appearance of perfect health; for eighteen months that she has been married, she never felt any other trouble than that for which she claimed our attention; for a year she has had a pain in the larynx, which was decidedly increased whenever she spoke much. Her

voice easily grew hoarse, and became more and more grave; about the fourth month of the disease the larynx was swelled and painful, and occasionally, in the evening, the voice was completely lost. The disease grew worse, and six weeks before she came to the hospital, she had entirely lost her voice.

Still there was little cough, and no external sign or general symptom which indicated pulmonary tubercular lesion. The sound was similar under both clavicles, the respiratory murmur feeble, the inspiration full, and without mucous rattle. There had been no hæmoptysis, no disposition to diarrhœa, fever, or emaciation.

We supposed there was a chronic phlegmasia of the mucous membrane of the larynx, and as there was much pain, we should certainly have applied leeches and used emollients had not these means already proved fruitless. We therefore applied a saturated solution of the nitrate of silver to the throat and upper part of the larynx.

Vomiting immediately followed, and deglutition was difficult for two days; but after seventy-two hours the voice became more sonorous, it was still very hoarse, but could be easily heard at the distance of ten yards.

We prescribed a saturated solution of alum as a gargle, and frictions of the alcoholic extract of stramonium to the front of the neck. Still, as the voice did not improve decidedly, we renewed the cautery a fortnight after the first application. The improvement was now evident, and one month from the commencement of the treatment, the voice was restored; but she could not long speak aloud without pain and hoarseness. Our efforts to combat the pain with frictions of belladonna, and the application of morphia to blisters on the front of the neck were useless. We then thought that the obstinacy of the inflammatory symptoms was chiefly owing to a constitutional syphilitic affection, and therefore commenced a mercurial treatment; and under the influence of this new medication there was some improvement. There was still pain in the laryngeal region, and a troublesome disposition to get hoarse from the slightest cause, but the more alarming symptoms of laryngeal phthisis were dissipated, or perhaps rather masked.

OBSERVATION XLII.

Aphonia after a hoarseness that had lasted a long while.—Very frequent cauterisation.—Incomplete re-establishment of the voice.—Five months after, threatened suffocation, tracheotomy, death.—Tuberculous and poly-pous tumour in the larynx.

M. de Serry was directed to us in January 1835 by Dr. Paradis of Auxerre. For a year past he has occasionally observed his voice at first a little cracked, and soon permanently hoarse; by de-

grees, the timbre became more grave and less sonorous; and at last, for two months it has been entirely lost; there was no pain or swelling in the laryngeal region. He has never had catarrhs or hæmoptysis; no organic lesion of the pulmonary tissue could be detected by the most thorough auscultation and percussion. He seemed to enjoy the fullest health, all the functions except that of the larynx were perfectly executed. We need scarcely say that the antiphlogistic and revulsive treatment with mild and debilitating regimen had been used without success. We determined to employ the cautery, which was used daily for a week, then three times a week for a fortnight, afterwards twice a week for the same period, and then only once a week for a month; neither pain nor inflammation ensued. For a week there was no melioration, then there were some very hoarse sounds; at the end of a month the voice had some character, but was very hoarse; finally, at the end of two months and a half, the patient spoke with a cracked voice, and at last he could make himself heard in a large hall, in the midst of a crowd of persons speaking aloud.

M. Serry then left Paris. The rest of his history may be found in the first observation. Notwithstanding the condition of the mucous membrane, we were able to modify it to some extent, as the character of the voice was restored.

Pulverulent topical remedies.—We were led by that sure guide, analogy, to apply irritants to the larynx. We observed that collyria of corrosive sublimate, sulphate of copper, nitrate of silver, and sulphate of zinc modified the chronic phlegmasia of the mucous membrane in ophthalmia both rapidly and happily.—Similar results were observed in the nasal fossæ, and we supposed it would be the same with the larynx: experience proved that our conjectures were well founded.

It cannot be denied that the introduction of liquids into the larynx is attended with difficulty; the operation is unpleasant for the patient, and the sudden constriction of the glottis always prevents the medicine from penetrating far. We want, then, some method of applying therapeutic agents to the whole of the larynx and even to the upper part of the trachea.

Aretæus had already prescribed insufflations of powdered alum to the larynx in malignant angina, and it must be confessed that at the present day, this medicine, which has been introduced by M. Bretonneau of Tours, is one of the most powerful agents we have, to check the extension of false membranes from the pharynx into the air passages.—Aretæus's instrument was a simple reed. M. Bretonneau used a tube with a bulb in its course, traversed by gauze. These instruments were always employed by the physician or attendants when the patients were children; the patient should make his inspirations coincide with the insufflation; still the powder may fall into the pharynx, and upon the tongue, and provoke efforts of vomiting or a spasmodic constriction of the gullet, which may defeat our object.

It appears to us much better to confide the insufflation to the patient himself. The apparatus is in fact the reed of Aretæus, a glass tube being substituted for it. This tube should be two lines in diameter, and eight or ten inches long.

Three or four grains of the powder is to be put into one end of the tube, the other extremity is to be placed as deeply in the mouth as possible.

After emptying his lungs by a strong expiration, the patient closes his lips upon the tube, and then by a quick effort of the diaphragm, takes breath rapidly.

The column of air, in traversing the tube, divides and hurries along the powder towards the pharynx, but a part, suspended in the air, penetrates the larynx and upper part of the trachea. We are advised of its having entered the larynx by fits of coughing, which the patient should repress as much as possible so as to preserve the medicine in contact with the affected tissue. These inspirations are repeated more or less frequently every day, according to the state of the larynx, the nature of the powder, and the manner in which it is borne.

We have in this manner introduced pulverulent collyria into the larynx, as easily as into the eyes. We use powdered sugar, the subnitrate of bismuth, calomel, red precipitate, the sulphate of zinc, sulphate of copper, alum, acetate of lead, and especially nitrate of silver.

Sugar and subnitrate of bismuth, may be used pure, the calomel, mixed with twelve times its weight of sugar; red precipitate, sulphates of zinc and copper, with thirty-six times their weight, alum with twice, acetate of lead with seven times its weight, and the nitrate of silver, with seventy-two, thirty-six or twenty-four times its weight of sugar. These are the proportions we generally adopt, but they may be varied ad infinitum, and must be regulated by the state of the larynx and the susceptibility of the patients.

The apothecary should be directed to prepare these powders on a porphyry slab, otherwise, small crystalline asperities remain, which act as irritants and provoke repeated efforts of coughing, which do not allow the patient to retain the powder.

When the laryngeal affection is not serious, we use the subnitrate of bismuth. Observation XXVI proves its efficacy, even where the disease from its commencement was owing to crude tubercles in the lungs. The following case will afford further evidence of the innocuity and utility of this substance.

OBSERVATION XLIII.

Scrofulous constitution.—Apthous eruption in the mouth and throat.—Acute catarrh.—Cure.—Continued hoarseness and pain in the larynx.—Inspirations of the subnitrate of bismuth.—Rapid recovery.

Mr. d'H. while growing up, had some enlarged cervical glands,

a few of which suppurated. His whole appearance is scrofulous. At the school of Saint Cyr, where he was in 1827, he had an aphthous affection which invaded the whole of the mouth and pharynx, and continued a long while. The disease re-appeared in 1833, and was easily cured. From this time he was free from pain in the throat. At the commencement of the winter of 1835, he went hunting, took cold, became hoarse and had a pain in the larynx to which he paid no attention. The cold was cured in a few days, but the pain in the larynx continued and was accompanied with a dry cough and hoarseness. The obstinacy of this apparently slight affection induced M. d'H. to claim our attention. We directed four grains of bismuth to be taken by inspiration four times a day—five days sufficed to dissipate the cough and hoarseness. As some swelling remained in the tonsils we touched them twice with the pencil of nitrate of silver, and the cure was complete.

We use insufflations with acetate of lead, alum, the sulphates of zinc and copper, and nitrate of silver, in cases of laryngitis without ulceration, when sugar and sub-nitrate of bismuth have proved ineffectual. We always begin with alum, when we suspect the presence of swelling of the mucous membrane without a high grade of inflammation. Such was the case with the child cured of croup by tracheotomy, recorded in Obs. XV.

We consider insufflations with nitrate of silver always indicated, not only when there is a simple erythema of the mucous membrane, but even when erosions or ulcerations exist; it is the article we generally use. The insufflation is made twice or thrice a week, or even every night, according to the susceptibility of the larynx, and strength of the powder.

We never use calomel and red precipitate, which are so powerful in chronic, syphilitic, or other ulcerations, except when we have reason to believe that ulcerations exist in the mucous membrane. Such was our diagnosis with Mme. G., Obs. XXXIX. But we should make one important remark in regard to these medicines. Practitioners have no doubt observed that when calomel or red precipitate mixed with sugar, in the proportions above mentioned, is blown into the eyes, a slight irritation follows, which lasts some hours, and if the insufflation be repeated two or three times a day, an acute phlegmasia will ensue. The same holds with the indiscriminate use of mercurial unguents.

What we see occurring in the ophthalmic, occurs equally in the laryngeal mucous membrane. We therefore, at first, only advise two or three applications a week; experience has proved, that the symptoms grow worse if they be repeated once or twice a day at the beginning. But, as the patient becomes accustomed to them, we may and should repeat them more frequently, and also increase the proportion of the mercurials in the powder.

We repeat, we advise mercurial insufflations in laryngeal phthisis, consequent upon a common inflammation, as well as in

those of a syphilitic character. They are equally applicable to both.

Mercurial medication.—A reference to the ponderous tomes on the use of mercury, and an impartial examination of the cases published to prove its efficacy, will convince us that many of the most acute and serious inflammations, many chronic engorgements and ulcerations in various situations, have been cured by this class of remedies; and, perhaps, their chief efficacy in syphilitic affections depends upon their power of modifying the general, and, consequently, the local condition of the organism, rather than upon any specific virtue, as many of our cotemporaries have contended.

Living in a country where mercury is given profusely, and, we may add, with little discretion, we have had an opportunity of witnessing its effects on most diseases. In this way, chance has, perhaps, shown, that the mercurial plan has often effected cures in laryngeal phthisis, when so far advanced that no hope of recovery was entertained. M. Pravas, in his thesis on laryngeal phthisis, in 1824, called the attention of the profession to this important point of therapeutics. The four following cases will impress our readers better than any explanations.

OBSERVATION XLIV.

Hoarseness for fifteen years.—Coryza, with scurfy secretions, for five years.—Intense cough.—Croup.—Fever.—Emaciation.—Complete aphonia.—No signs of tubercle.—Mercurial treatment.—Cure.—Relapse.—Treatment resumed.—Effectual cure.

Mrs. B—— is thirty-four years old; she married at eighteen, prior to which she had enjoyed excellent health. Her husband was a libertine, and debauched in his habits. Still, she never experienced the least leucorrhœal discharge, nor the slightest symptom of disease in the parts. Could she have had a chancre at the neck of the uterus? It is impossible to say.

Shortly after her marriage, when eighteen and a half years old, she travelled to England, where she contracted what a physician of that country called a disease of the liver; she was treated with large doses of calomel, and in six months her hair and eyelashes fell off entirely; about the same time she began to have pains in the throat and ear, which were exacerbated at the menstrual period. From this period, the voice, which had been sweet and sonorous, occasionally became hoarse, especially during the heat of summer.

Nine years afterwards, in 1829, she felt lancinating pains in the frontal sinuses, with a considerable flow of mucus from the nose, then loss of smell, permanent coryza, swelling of the nose, scurfs, superficial ulcerations, and fœtor. The olfactory membrane was a bright red.

Sometimes the coryza was moderated, when active inflammation occurred, and the throat, nose, larynx, and intestines were successively and separately affected.

In 1831, there was complete aphonia, which lasted two months and a half, accompanied with pain in the laryngeal region, and decided remission in the coryza. From this time the voice was always nearly extinct; it became hoarse again whenever the inflammation of the nose grew worse.

In January, 1835, after the fatigue of a round of balls, while dressing for an assembly, Mrs. B. was seized with great oppression, which rapidly increased; the orthopnœa soon became extreme, repeated fits of croupy cough occurred, and in four hours she had all the symptoms of fully developed croup.

Dr. J., her usual attendant, recognised acute laryngitis, or rather, what has been improperly considered œdema of the glottis, and controlled the alarming symptoms by applying leeches to the neck, sinapisms and bleeding.

The voice was now completely lost; the larynx painful. We were called in consultation, in the end of April, 1835.

The character of the disease of the nose, the scurfy secretion constantly arising from it, the nearly permanent pain in the throat, the falling off of the hair fifteen years previously, and, above all, the bad habits of the husband, induced us to believe it was a syphilitic affection that had never been revealed by a local symptom. The case was becoming urgent; there was constant cough, frequent fever, and emaciation; in a word, phthisis seemed advancing.

Still, the thorax presented no abnormal sounds. We determined to employ a local and general mercurial course.

Every third day the patient took a bath, in which half an ounce of corrosive sublimate had been dissolved. Thrice a day she inspired into the nostrils a powder composed of two drams of sugar and twelve grains of calomel and red oxide of mercury.

After pursuing this plan for two months the cough ceased, the disease of the nose was entirely dissipated, the voice re-established, embonpoint increased, and every thing went on well until the beginning of the winter of 1835 and 1836, when the voice was altered, but the symptoms again disappeared in a few days, after touching the pharynx and upper part of the larynx with a solution of nitrate of silver, and insufflating a little sugar and calomel, at the same time that some baths of the bi-chloride were administered.

OBSERVATION XLV.

Dr. Thomann has published the history of a laryngeal phthisis that was successfully treated.

A miller,¹ aged thirty-three, enjoying good health, though not robust, fell twenty-four feet with a sack of meal on his shoulder. His thorax struck a log of wood, and he was senseless for three or four minutes. When he recovered, he continued three or four

¹ Annales Instituti Medico-clinici Wirceburgensis, 1799.

hours in a state of great anxiety, with a violent cough, spitting blood, at first bright, afterwards black and grumous. Cold lotions were applied to the head and chest, and he soon felt a pain in the thorax, which was increased by respiration and pressure; this passed off in about nine days, and he felt no other inconvenience than lassitude. But, after this, his voice was gradually lost, so that he could only speak in a very low tone. He came to the hospital of Wurtzburg on the 15th of September, 1799, when he was unable to utter a word distinctly; he coughed badly, and expectorated viscid and purulent matter.

Little ulcers, of a lardaceous appearance, were found in the gullet: he complained of lassitude in his limbs, of emaciation, and of a slight pain in the laryngeal region, which was increased by deglutition. Gentle pressure caused a sound like that of a fracture of the hyoid bone, or of a cartilage; the cough was increased by it, and the patient felt as though there was a foreign body in the larynx. The pulse was feeble and frequent; the other functions were well performed, and there was no symptom of pulmonary phthisis. Thomann prescribed a powder composed of henbane, golden sulphuret of antimony, and sugar, to be taken in three doses during the day; and a decoction of lichen islandicus for drink. The diet was mildly nourishing, on account of the patient's debility.

From the day of his entrance until the 18th there was no change in the symptoms. The same powder¹ was continued, the whole dose being given, and wine and water for drink, to which two spoonfuls of the following mixture were added:—Decoction of cinchona f ʒviij., honey f ʒj.

This treatment was continued until the 24th, without much improvement. A blister was then applied around the neck, and a mixture of infusion of the flowers of arnica, extract of cinchona, and honey.

These means having been continued until the 1st of October, the voice was still suppressed, but the cough and lassitude had disappeared. The embonpoint returned, and there was less difficulty in respiration. Calomel, with opium and sugar, were given to cure the ulcers of the throat, though there was no symptom of syphilis. The neck was anointed with camphorated volatile liniment.

On the 8th of October, the ulcerations presented a more favourable aspect, and daily progressed towards a cure; on the 15th they were contracted, and on the 20th entirely cured; the voice was more distinct, and the other functions well performed. On the 22d, the patient left the hospital in a state of convalescence; he resumed his laborious occupations, the voice gradually regained its natural tone, and there was no relapse.

¹ We are left to conjecture the dose.—*Translator.*

OBSERVATION XLV. bis.¹

A baker, forty years old, who was of small stature, thin, and very irascible, and had never suffered any serious indisposition, in the winter of 1815 took a journey, during which he was much exposed to wet and cold, and in 1816 was much affected with indisposition. When M. Henning saw the patient he had a very hoarse voice; acute pain in the throat; almost constant cough and irritation, with a sense of heat and pricking in the œsophagus; there was also insomnolence, anxiety, difficulty of swallowing solids, and, five or six times a day, a transient lancinating pain in the right cheek above the zygomatic bone. This pain passed to the pharynx, becoming more violent, and causing a violent attack of coughing. There was constant dryness of the throat and burning fever. After the appearance of these symptoms an inflammation of the joints, with pain and swelling, had entirely disappeared. On examining the mouth nothing was discovered but a bright redness behind the palate. The neck was decidedly swelled about the thyroid gland, and when this part was touched, it was found better than the neighbouring region, and the patient felt acute pain extending into the trachea; and if he made an effort of deglutition at this time, all the parts interested in the function were called into action, and there was strong pulsation of the arteries. Nothing was observed in the neuralgic cheek; all the buccal cavity, especially near the epiglottis, was covered with viscid mucus; the pulse beat 100 in a minute. M. Henning recognised in all these symptoms an inflammation of the larynx, in which the commencement of the œsophagus participated; and, as it had lasted nearly three months, it had greatly enfeebled the patient. Eight leeches were immediately applied to the neighbourhood of the larynx, and followed by frictions of equal parts of volatile liniment and mercurial ointment, which were repeated every two hours, and after each application the surface was covered with an emollient poultice. A dose of nitre was taken internally. The cheek was similarly rubbed, and pediluvia were frequently used, in which elder and camomile flowers had been steeped. Two days of this treatment had effected no melioration, and the patient continued constipated. A blister was applied between the shoulders, an enema was administered, and as the pulse continued the same, leeches were applied to the arms and calves of the legs. Abundant sweats, and improvement of all the symptoms followed. Calomel, and extract of aconite were administered, and afterwards camphor and opium. All the symptoms of inflammation of the larynx ceased, and the facial pain alone remained, and even increased in frequency and intensity. It would be useless to repeat all the means that were unsuccessfully employed to combat it. Some time afterwards, the

¹ Bibliothèque Médicale, tom. lxxix.

patient died suddenly of apoplexy, and we could not obtain permission to examine the body.

We are here presented with a phlegmasia, occupying the mucous membrane of the larynx, trachea, pharynx, and œsophagus. The mercurial frictions were probably used because of the attendant neuralgia. The history of the treatment clearly proves that no appreciable benefit was derived from the local bleedings. The first application of leeches to the neck diminished none of the symptoms. No melioration was observed until the mercury began to act upon the system. We cannot believe that the leeches applied to the limbs could have diminished the erethism; general bleeding would have been better calculated to fulfil this indication.

OBSERVATION XLVI.¹

Chronic laryngitis after a sharp cry—Hæmoptyses—Slight pricking pain in the larynx—Alteration of the voice—Seton—Mercurials—Strict silence—Emollient fumigations—Decided improvement—Mineral waters of Mt. d'Or—Cure.

In June, 1811, Madame C. lost an only and darling son; in her despair she uttered so shrill a cry that she felt something *tear* in her throat. From this epoch she had hæmoptyses in the mornings; at the moment of waking she felt a little mass separate from the painful point, this was expectorated with some drops of blood. At the lower part of the larynx, there was a constant pricking sensation, which induced her to place her hand to the part. These symptoms continued without much increase until the summer of 1813, when, being one day overheated by a ride on horseback, she spat much blood at intervals; the pain was more acute, and was aggravated by spiced food, or by food too hot or too cold. She felt as though there was an open wound. As the disease was advancing, her husband, from whom she had long concealed her sufferings, determined to consult a physician; but, whether indifferent to her lot, she had not given a correct statement of her condition, or the physician did not pay sufficient attention to it, the disease was mistaken. Tonics and stimulants were prescribed, such as wine of cinchona, and the concentrated essences of meat, which exasperated all the symptoms. She had very acute sympathetic pains in the superior extremities and in the back, her voice was altered and the fever continued. A second physician prognosticated that she had reached the last stage of pulmonary phthisis. Mr. C., being justly alarmed, brought his wife to Paris, that she might enjoy the advice of the most celebrated men. Dr. Itard, to whom he was introduced, immediately recognised the character of the disease, which he judged very serious from its duration, the emaciation, and the extreme debility of the patient; he called Pro-

¹ Pravaz, Recherches pour servir à l'Histoire de la Phthisie Laryngée. Thèse, Paris, 1824, 4to.

fessor Hallé in consultation, who made an equally unfavourable prognosis. It was agreed that little moxas should be burnt in the neighbourhood of the painful point.

M. Itard, who continued to take charge of the case, had already applied a pitch plaster, sprinkled with tartar emetic, with the intention of exciting revulsive action. The moxas, which produced little effect, were followed by a seton, which was worn a year. Various mercurial preparations were long employed to combat a lymphatic predisposition of the system. Soothing and mild regimen was prescribed, and silence recommended; to these means were added inspirations of emollient vapours. The patient shut herself up in a large closet every morning, so arranged that she could read while breathing the vapour of a quart of milk, produced by the heat of a spirit-lamp. Leaving this sort of *stove*, she passed into a moist atmosphere and mild temperature in her chamber, produced by boiling the flowers of marsh mallows, violets, and other mucilaginous plants. If she left this, she took care to breathe from a retort with two tubulatures, in which was a mixture of ether and balsam of tolu, so arranged that the air should be impregnated with the medicines. When the symptoms of irritation had disappeared, aromatic fumigations were prescribed, procured from the combustion of balsam of tolu, which was to be applied to the throat for some moments. This rational treatment, seconded by the most delicate offices of friendship and conjugal affection, induced a considerable amendment in all the symptoms. M. Itard thought that the thermal waters of Mont d'Or might suit the patient and conduce to her convalescence; she was therefore sent in the month of May, to Clermont, to accustom herself to the mountain air. She still spat some blood, but this symptom disappeared while using the waters. She regained her embonpoint and was cured. A little sensibility of the larynx remained; and for some months after her return, she continued to sleep in a very clean stable. She was next year sent back to Mont d'Or, to confirm the happy cure, which has continued permanent.

We shall cite, hereafter, some observations in which laryngeal phthisis, so far advanced that tracheotomy was deemed necessary, has been cured by an active mercurial treatment, even when the patients had no syphilitic taint.

How does the mercury act in these cases? By what therapeutic avenues can it modify so serious alterations as those we usually find? We shall not attempt to answer, confident that we should only hazard hypotheses which a thorough investigation might not support.

Iodine.—The same will not hold of the action of iodine, which, if no better known than that of mercury, at least produces more constant effects, that we may compare with analogous results observed in other parts of the economy. We see large doses of tincture of iodine cure secondary symptoms of syphilis, resolve bony tumours, glandular engorgements, &c. &c. Its most striking

effects are the atrophy of indurated and sound tissues, therefore it is not extraordinary that this medicine should also discuss chronic engorgements of the larynx. This article was rather spoken of than tried by the Germans, and has only been used by us in laryngeal phthisis; once without success, at another time with decided advantage.

OBSERVATION XLVII.

A locksmith, living in Paris, came to consult us, two years ago, for a serious affection of the pharynx and larynx. He told us that he had had syphilis, which was followed by angina. He then consulted M. Biett who prescribed pills of the proto-iodide of mercury; and after this treatment all the syphilitic symptoms disappeared, leaving only a great susceptibility of the pharyngeal mucous membrane. The pains soon became more acute and were extended to the larynx; these symptoms having alarmed him he again consulted M. Biett, who advised a second mercurial course, but without advantage. M. Marjolin, also thought the disease had a syphilitic origin, and various mercurials, and sudorifics were vainly administered. M. X. then came to claim our care. The tonsils, the veil of the palate, and the uvula were much swelled and of a bright red; the epiglottis, which was plainly seen when the tongue was depressed, was very red and much tumefied. Deglutition was painful; there was a sense of burning in the larynx when M. X. ate or spoke. The voice was not much altered.

We began by cauterising the tonsils and epiglottis with nitrate of silver, twice a week. This simple and easy treatment dispersed the swelling and redness of the gullet in one month, but the larynx continued as bad as ever. We were about introducing the caustic into the entrance of the glottis, or directing inspirations of the powder of alum, when it occurred to us to try iodine. We prescribed the tincture in doses of ten drops night and morning, in half a glass of sweetened water. In one week there was decided improvement, in another the patient seemed cured; and has continued to be so. We have not had sufficient experience in the use of this medicine to speak confidently of its virtues from an isolated fact, and should not have mentioned it, had not the journals frequently adverted to its efficacy in the treatment of chronic diseases of the pharynx and larynx.

Sulphur; sulphurous mineral waters. Many physicians, chiefly those who have embraced the opinions of the new French school, consider as almost fabulous the cases of cure reported by Borden and many others, effected by the waters of Bournes and Cauterets. But they who have studied the effects of the Pyrenean waters upon the spot, they who have often sent to them their patients, evidently attacked with pulmonary tubercles, will acknowledge the admirable cures which have been annually effected by this powerful means. Therefore we should never neglect the use of sul-

phurous mineral waters, whether natural or artificial, in the treatment of various forms of laryngeal phthisis. Although secondary, they may unaided effect a cure in the early stages of the disease. We select the following case from a host of others.

OBSERVATION XLVIII.

Hoarseness.—Aphonia.—Gargles of alum without advantage.—Milk diet and Bonnes waters.—Cure.—Relapse after imprudence.—Return to milk diet and Bonnes waters.—Cure in five weeks.

Mr. D. captain of artillery, thirty-four years old, was born of tuberculous parents.

His voice is rather grave, and not very strong, except in the high notes.

He attended balls and soirées and was much in the world, for three months, when he perceived that his voice was hoarse, and complete aphonia soon followed.¹ There was no expectoration or pain in the larynx, and the general health continued excellent, only he was extremely fatigued by the great efforts that were necessary to make himself understood.

There was nothing to induce a suspicion of disease in his lungs, he had never had hæmoptysis, catarrhs, or angina.

He used a gargle of one ounce of alum to a pound of water for a fortnight without amendment.

Milk diet was then prescribed with some advantage; to this was added one bottle of Bonnes waters per day. This soon effected an improvement and a complete cure at the end of two months.

He went into Normandy to spend the summer; one day, after having taken a very hot bath, he walked on the sea shore, and returned to Paris with a violent pharyngeal angina and complete aphonia. He was again put upon the use of warm milk.

Tartar emetic ointment was rubbed into the neck morning and night; the Bonnes waters were resumed, and after five weeks of this treatment, his voice had regained its natural tone.

A curious remark, which confirms what physiologists say of the intimate relation which exists between the organs of generation and those of phonation, is, that M. D. was always better when his wife was unwell, and he abstained from intercourse.

Treatment by topical applications to the pharynx.—We have seen that chronic inflammation of the larynx, and laryngeal phthisis resulting therefrom, have originated from a phlegmasia of the mucous membrane of the tonsils and veil of the palate, and sometimes even the simple tumefaction and procidence of the uvula. Caries of one or two teeth often keeps up a constant fluxion to the throat and consequently chronic laryngitis. One of our greatest singers, Madame Mainville-Fodor, is said to have lost her voice in this way.

¹ It should be mentioned that he had thrown aside his flannel.

It would seem that in this case, the inflammation is propagated by continuity of tissue, as we see vaginal catarrh succeed inflammation or ulceration of the neck of the uterus ; or, a fistulous ulcer from caries becoming the cause of chronic inflammation and induration of the surrounding cellular tissue. In this case, the cure of the original disease, if we may be allowed the expression, dissipates the secondary symptoms. Thus, the excision of the uvula, or tonsils, and the extraction of a tooth, may effect the cure of incipient laryngeal phthisis, caused by the disease of the throat.

Bennati, who had some success and great reputation in the treatment of laryngeal affections, attached great importance to topical applications to the tonsils and base of the tongue. He prescribed almost exclusively aluminous gargles.

The solution should be strong, a scruple, half a dram, and even a dram to the ounce of water. The gargles should be frequently repeated every day. Bennati employed sulphate of zinc in the same proportions.

We prefer the nitrate of silver. When the pharynx and larynx are simultaneously affected, we touch the tonsils and veil of the palate two or three times a week with a stick of nitrate of silver, with a sponge soaked in a saturated solution, or we introduce with the finger, a powder composed of six or eight grains of the nitrate of silver to a dram of sugar candy. A saturated solution of the sulphate of copper, or zinc, or of corrosive sublimate, equally answers this therapeutic indication.

But we may combat laryngitis by these means with equal success, even when there is no chronic phlegmasia of the mucous membrane of the fauces. It is difficult to explain how an application to the tonsils can modify a laryngeal phlegmasia, but such is the fact, and analogy shows us that such a result ought to follow. In the beginning of this chapter, we have seen that cauterisation of the superior part of the larynx cured inflammation which was often seated beyond the immediate influence of the caustic ; it is not more surprising that cauterisation of the base of the epiglottis and tonsils should produce the same results.

Physicians who treat diseases of the ear well know that cauterisation of the tonsils alone sometimes effects a cure of catarrh of the Eustachian tube ; it is not more remarkable that the same remedy should have a parallel influence upon catarrh of the larynx.

It may be said that this is done by revulsion, and that the irritant acts as a vesicatory, and concentrates at this point the inflammatory congestion ; which is not an improbable explanation ; we must admit, however, that the organic modification impressed upon the tonsil, is transmitted to the mucous membrane of the ear and larynx : This is a question of little importance which we shall not attempt to decide.

Treatment of syphilitic laryngeal phthisis.—When we have every reason to suspect the syphilitic character of a case of laryn-

geal phthisis, many indications are presented according to the alterations of the pharynx, which indeed sometimes claim our principal attention, provided the inflammation and swelling of the mucous membrane of the air passages be owing to an extension of that in the back of the mouth; in the same way that the inflammatory procidence of the uvula is often evidently caused by an organic alteration of the nasal fossæ or of the tonsils.

If then this form of laryngeal phthisis is only an extension of the pharyngeal inflammation, we should always direct our remedies, whether general or local, to this affection.

But when laryngeal phthisis is idiopathic, and the organic lesion confined to the larynx, besides the means generally indicated to combat the usual inflammatory symptoms, we should also attend to touching the throat with a solution of the bichloride of mercury, and to inspirations of calomel and red precipitate in the proportions we have specified.—See Observations XX, XXI, XLIX, XLIX bis, XLIX ter.

The general treatment is just what all enlightened physicians would advise in constitutional venereal disease.

The five following observations, which we select from many analogous cases, will show the happy influence of anti-syphilitic treatment in this affection.

The first three, and Nos. XX and XXI, which are taken from our own practice, will give our readers an idea of the treatment we have adopted in similar cases.

OBSERVATION XLIX.

Syphilitic laryngeal phthisis.

Mr. P. aged fifty years, had contracted syphilitic chancres in 1828. He was cured by a short, local, and mercurial treatment. A year afterwards, without having been again exposed to contagion, he had violent pain in the throat. His physician recognised an ulcerative syphilitic angina, and prescribed a thorough course of mercury. The disease was cured, but the throat was soon sore again. It was filled with hard rounded vegetations; the veil of the palate adhered to the posterior and superior part of the pharynx, the voice was altered, became hoarse, was afterwards extinct, and at last habitual dyspnœa supervened.

These alarming symptoms were combated by the local application of nitrate of mercury,¹ (*nitrate acide de mercure*,) by all sorts of gargles, by repeated applications of leeches, by blisters *loco dolenti*, by seton to the muchæ, and internally by repeated mer-

¹ This is supposed to be a solution of nitrate of mercury in nitric acid, highly recommended by MM. Cloquet and Recamier as a caustic in obstinate syphilitic and scrofulous ulcers, &c. Vide Ratier's Formulary, p. 231, et seq.

curials, by the tisan of Feltz,¹ by the biscuits of Ollivier, and by the muriate of gold. A temporary melioration was obtained during the summer; but the symptoms returned with new force in the winter, and from the beginning of 1835 M. P. obtained no relief, and seemed likely to die of asphyxia. In the month of May he consulted M. Marjolin, who sent him to us.

We have already mentioned the appearances presented by opening the mouth. But by introducing the finger to the epiglottis a mass of irregular and uneven tumours was felt in the larynx and almost closing the œsophagus. The sensation received was like that of a deeply ulcerated uterine cancer.

The voice was extinct, but became hoarse and cavernous when he made great efforts. Respiration was so very laborious that when he reached our office, (which is on the second floor,) he had to wait five minutes to take breath before he could speak. The air, as it passed the larynx, produced a sharp hissing in the inspiration; the expiration, though not braying, was painful, so that the expiratory muscles were called into active exercise.

No trace of pulmonary lesion was discovered in the sounds of the thorax. The patient, who was naturally fat and florid, had lost more than twenty pounds, was weak, and had no appetite.

Still we did not despair of effecting a cure, and directed the following course:—

1st. To avoid, as much as possible, speaking, coughing, or spitting.

2d. To avoid exposure to the morning and evening air.

3d. Every four days to cauterise the pharynx and upper part of the larynx, either with a solution of nitrate of mercury, of nitrate of silver, or with chloride of gold, dissolved in nitro-muriatic acid.

4th. To use a gargle daily of a saturated solution of alum.

5th. To insufflate the following powder twice a day:—

℞. Hydr. chlor. mit. ℥ij.

Pulv. sacch. crystal. ℥ss. M.

To be followed in five minutes by a gargle of water.

¹ *Tisan of Feltz.*

℞. Radicis sarsap. concisæ ℥iij.

Ichthyocollæ ℥ss.

Pulv. antim. crud. ℥iv.

Aq. fontanæ ℔vj. M.

Boil down to one half; strain. Take half a pound three times a day.

Formula for the Tisan.

℞. Rad. sarsaparil. ℥ij.

Rad. chinæ ℥j.

Sulphur. antimon. ℥iv.

Ichthyocol.

Cort. buxi

Cort. hederæ aa. ℥iss.

Aq. puræ ℔xij. M.

Enclose the sulphuret of antimony in a linen bag, and boil the whole until half the liquor has evaporated; strain through a sieve, allow it to settle and decant, dissolve in it hydr. bichlor. grs. iij. Dose: a pint a day.

6th. To use fumigations of cinnabar as follows :—throw a small portion of powdered cinnabar on a hot chafing dish, and receive the vapour in a funnel placed in the mouth; this to be repeated five or six times successively if it caused no pulmonary irritation.

7th. Take Bonnes water, either in Paris or in the Pyrenees.

Our patient has been at Paris for two years, with re-established health. Before publishing this case we wished to have some further account, and we therefore present the statement of his physician, M. Collin.

“Respected sir,—Mr. P. is doing well; the cough, expectoration, and difficulty of deglutition have ceased; his rotundity of figure and strength have returned; and, except the change in the quality of his voice, which he has had seven years, there is no trace of the disease.”

This cure, which is truly remarkable, considering the gravity of the organic derangements, recalls the following relation of Morgagni, Letter 44, § 15.

“*Senex decrepitus lue venereâ plurimos jam annos malè mulcatus, ut quæ loqueretur vix intelligeres, urinæ autem difficultate, et gonorrhœâ denique à duodecim annis laboraret, his malis, et ipsâ ætate, lentè confectus, vitâ cesserat ante medium Januarium anni 1717. Cadaveris, quasdam partes in nosoconio dissecantes, hæc quæ ad propositos morbos spectarent, animadvertimus. Uvula, cujus pars deerat, linguæ superior postrema superficies, et annexa olim per ligamenta epiglottis cartilago ita erant cicatricosæ, ut nihil magis. Itaque ea cartilago inæqualiter contracta, in triangularem propemodùm veraticem desinebat, multò caninæ similior quam humanæ. Quin vitium in laryngem reliquam, et huic proximum asperæ arteriæ truncum se propagabat: eratque arytenoidum altera quasi luxata, non compari parallela. Intra illam autem arteriam inæquales magnique prominebant quasi lacerti, &c.*”

OBSERVATION XLIX bis.

Thirty-four years of age—Syphilitic disease for eight years—Mercurial treatment—Cure—Six years afterward, angina, at first in the pharynx, then in the larynx; cough, aphonia, pain in the larynx—Orthopnœa, mercurial treatment, salivation—Rapid recovery.

M. aged thirty-four, a lace maker, came to the hospital on the 19th of July, 1836.

In 1828 she had the venereal disease, with chancres, that disappeared in one month, and buboes that lasted three months. The treatment consisted in the use of the liquor of Van Sweiten, which was used six weeks. The cure seemed complete until the 12th of November, 1834, when she had a happy accouchement.

The fifth day after delivery a slight pharyngeal angina occurred, which lasted a month, and was followed by pricking pain in the larynx, and frequent fits of cough. At the same time there was

acute pain in the larynx, and a hoarseness which, after a month, became complete aphonia. All these symptoms continued.

In the course of May, 1835, she was bled four times, seventy-five leeches were successively applied to the throat, and three blisters in front and at the sides of the larynx; these measures effected nothing, the patient even affirmed that the cough became more frequent and severe.

Three months after birth, the infant had pustules on the genitals and nates, which the physician pronounced syphilitic.

The mother and child were admitted into the venereal hospital, where M. Ricord confirmed the diagnosis that had been made of the child's disease. The pustules were powdered with calomel; lotions of the chloride of soda were employed. The cure was effected in three weeks, and from that time he continued well. The mother employed no treatment at this time.

Present state, (July 19, 1836.) Complete aphonia for twenty months. When she speaks or takes breath, a hissing sound is heard in the larynx, as though the air passage was too small. Walking, even slowly, occasions great difficulty in breathing, and considerable laryngeal hissing.

The region of the larynx is rather painful; cough frequent; expectoration ropy; mucus clear. No pain in the pharynx; no difficulty of deglutition.

For three months the neck has been swollen, so that she has been obliged to lengthen her collar three inches.

The thorax offers no sign of disease. The general health appears pretty good, but there is constantly some fever.

Treatment.—Twice a day the neck is to be rubbed with Neapolitan ointment¹ eight parts, extract of belladonna two parts.

July 22d. There is some amendment; the frictions are laid aside. We prescribed, morning and night, a pill of one-sixteenth of a grain of proto-iodide of mercury; frictions to the arms and thighs, with four drams of Neapolitan ointment; a bath, with an ounce of corrosive sublimate.

25th. The cough has almost ceased. The gums begin to be touched. The frictions are discontinued.

26th. The patient can walk without oppression: the inflammation of the gums induces us to lay aside the active mercurial treatment: the pills alone are to be continued.

27th. She spoke for half an hour without getting out of breath; without cough or wheezing. Same treatment.

28th. The voice is clearer; at our desire she gave a strong and clear shout. She could walk easily without losing breath; the

¹ Neapolitan ointment; or, *mild mercurial ointment*.

℞. Adipis suillæ, ℥j.
Hydrargyr. pur. ℥ij. M.

Ratier's Formulary, p. 108.

cough has entirely disappeared; salivation continues. Same treatment.

29th. Same state. Two ounces of castor oil.

August 1st. There is a diminution of one inch in the circumference of her neck. Yesterday she could run up one flight of stairs without suffering oppression.

The infant has no symptom that would induce a suspicion of a syphilitic taint.

5th. The voice is quite natural.

7th. Every thing looks well, except the gums, which continue painful. Before the end of the month, she left the hospital perfectly cured.

OBSERVATION XLIX. ter.

Chronic disease of the larynx, probably syphilitic.

Mlle. Basinet, aged twenty-four years, was born at St. Ménéhould, where she has since lived. When seven years old, she had an exostosis on the left leg, which she attributed to a blow. Enlargement of the bone, without suppuration or redness of the skin, continued seven years. The pain was worse at night than in the daytime: she remembers, that as soon as she was in bed she had to get up again, because the pain was so acute.

At fourteen she menstruated, and the pain ceased; but the exostosis continued. The only treatment consisted of a hemlock plaster, which she wore for a year without benefit.

Excepting the exostosis, which was not painful, she enjoyed good health until she was twenty-two, when she had an obstinate chronic diarrhœa for two years; this was followed by a pain in the throat, which continued eighteen months, by spells of a month, with intervals of a fortnight, during which time no treatment was addressed to it.

In December, 1833, it became permanent, and much more violent. She saw no physician, nor consented to adopt any treatment until April 10th, 1834. There was then a round ulceration of the palate. A month later, there was a new ulceration in the veil of the palate which threatened its complete destruction.

Alkaline chlorides, nitrate of silver, and iodine, were prescribed without any improvement.

July 28th, 1834. She consulted another physician, who advised mercurial frictions to the neck, and touching the ulcers with creosote.

After pursuing this treatment for a fortnight, the gums were swelled, and so continued six months. There was a decided improvement, which lasted a fortnight, when all the symptoms returned with increased violence. She consulted another physician in November, 1834, who cauterised the throat with nitrate of mercury, (*nitrate acide de mercure*;¹) after six weeks the cure was

¹ See note p. 148.

completed. No general treatment was adopted. As the menses had been suppressed for five months, preparations of iron were given, and the flow was re-established in January, 1835. The health was then very good until September. In April, the first day that she took the iron, she perceived that her voice was hoarse; this insensibly increased until December, when there was complete aphonia.

At this period deglutition was again painful, though no alteration was observed in the tonsils. She began to cough, and this symptom continued. There was also a fit of suffocation for three days which yielded to bleeding, a blister to the neck, and purgatives. She continued better for six weeks.

In May 1836, frictions of chloride of gold were applied to the tongue, which treatment was continued thirty-nine days, but it harassed the patient so much that she could not endure it any longer. The suffocation re-appeared on the 20th of June, and increased so much, that on the 18th of July she seemed likely to perish from asphyxia. The fit was calmed by bleeding and a pediluvium with hydrochloric acid. Still, the throat was touched with nitrate of silver, which only alleviated the symptoms for two days.

As the suffocation continued to increase, Dr. Carré, seeing no resource but tracheotomy, sent her to consult us in Paris, where she arrived on the 22d of July.

When she entered our office she had hissing, difficult, slow, deep respiration, and seemed to be threatened with impending asphyxia. We immediately directed her to M. Pinel's Maison de Santé at Chaillot.

23d. Same state. A pill, morning and night of an eighth of a grain of proto-iodide of mercury; friction on the thighs with four drams of double Neapolitan ointment.

24th. No change. Same treatment.

25th. Rather less difficulty of respiration, the gums begin to be painful. Same treatment. Insufflation with a powder composed of one grain of nitrate of silver and one dram of sugar. The gums to be rubbed with powdered alum.

To take a mixture of six grains of red precipitate to a dram of sugar in powder, for the disease that has existed in her nose for a year and a half. The sense of smell had been lost for a year.

26th. Same treatment. Respiration is much easier in the morning, but embarrassed in the evening, though better than it has been for five weeks.

27th. Decided improvement; deglutition much easier; the gums are more painful: same treatment.

28th. The gums are rather less swollen than yesterday, the tonsils are rather painful. The hissing in the larynx is even less than yesterday. Continue the same treatment.

30th. Respiration has been completely re-established since yesterday morning; the hissing has entirely ceased. The patient can swallow liquids without coughing, which she could not do hereto-

fore. The gums are much swollen and very painful. No salivation. No cough since the 28th; an occasional hoarse sound for a few minutes. Stop the frictions, continue the pills and insufflations.

August 1st. The nostrils are almost free. Respiration is easy, even during violent exercise. The salivation decreases, though the gums are still painful.

The exostosis has diminished. Continue the insufflations and pills.

10th. The proto-iodide has been continued alone. The gums are not swelled, the tongue is no longer painful. For the last four days, especially in the mornings, there has been occasional phonation, which was dull and hoarse, but it did not last long, particularly when the patient endeavoured to increase its intensity. There is no more oppression, and the menstrual flux appeared yesterday at two o'clock. Continue the pills; make one insufflation to-day.

28th. No change, except that the cough and expectoration have disappeared for a week; we cauterised the epiglottis and upper part of the larynx with a solution of the nitrate of silver.

One day, while performing this operation, and depressing the tongue with a spoon, we discovered that the epiglottis was deeply cleft from top to bottom by a considerable ulcer, it was crenated on its edges like a cock's comb. The ulcer, if not cured, was at least in a very fair way; we cauterised it repeatedly.

Continue the pills of proto-iodide.

There is no pain whatever in deglutition. She no longer swallows awry, and considers herself cured. Still we advised her to persist in the use of the mercurials. It is not long since we heard from her that she continued to do well.

OBSERVATION L.¹

Hoarseness.—Pricking in the larynx, then pain in this organ.—Purulent sputa.—Antiphlogistic treatment.—Improvement.—Relapse.—Appearance of syphilitic pustules.—Mercurial treatment.—Cure.

Adelaide G., aged thirty-seven, of a lymphatic temperament, after delivery, fifteen months ago, experienced hoarseness, prickings in the larynx, dysphagia, anorexia and cough. Since then, these symptoms have frequently appeared and disappeared.

In the spring of 1820, the pain became fixed, the cough habitual, headach almost constant. Constipation obstinate, and abundant expectoration of sero-purulent sputa. The pharynx seemed inflamed and the epiglottis ulcerated.

M. Cloquet administered purgatives, mustard pediluvia, emollient gargles, refreshing drinks. Some local bleedings were prac-

¹ Papillon, *Recherches sur la phthisie laryngée*. Paris, 19 Mai, 1821, in 4to.

tised, and ten blisters were successively applied in front of the neck. Rigid diet.

There was great improvement after five weeks of this treatment; the pain, cough, dysphagia and anorexia ceased. Expectoration was less abundant and not more purulent; the epiglottis resumed its natural aspect; but the hoarseness continued, and night sweats prevented the re-establishment of her strength.

She left the hospital, but, eight days afterwards, all the symptoms re-appeared, and she returned. Pervigilium and hectic fever were added to her other sufferings. M. Fouquier, who now had charge of the hospital, used the same means that M. Cloquet had prescribed, but all efforts were fruitless.

After eight months, the vulva and other parts of the body presented syphilitic pustules. Fractional doses of mercurial ointment were then administered internally, and at the end of three months the patient left the hospital perfectly cured.

OBSERVATION LI.¹

Pain in the larynx—Hoarseness—Dyspnœa, then aphonia—Dysphagia—Emollient treatment without success—Threatened suffocation—Tracheotomy—Cure—Relapse after ten days—Appearance of a syphilitic pustule—Mercurial treatment—Lasting cure.

Emily Bailly, a dressmaker, aged twenty-three years, was admitted into the Hôpital de la Charité, on the 31st of December, 1821. She had long enjoyed good health, except some irregularities in menstruation. But for some years she has had a dry cough, which became more troublesome whenever she took unwonted exercise. Three months have elapsed since the commencement of the disease, which obliged her to come to the hospital. She says that, after sleeping by an open window, she awoke with considerable hoarseness and fever. She used an infusion of mallows and gum-water. The hoarseness and catarrhal symptoms disappeared after fifteen days of this treatment, only the voice was hard, and soon after became weak. It should be observed that she then worked on cotton fabrics. With the aphonia the cough became more frequent, and fatigued her more than before, but it was still without expectoration. At intervals there was a sense of oppression, especially on going up stairs, after active exercise, or when her mind was excited. Respiration was braying during the inspiration. Leeches and cataplasms were applied to the throat, and various other remedies employed, with some benefit. On the 30th of December, the oppression increased, sinapisms, and antispasmodics were used, and a blister applied to the front of the neck. Abundant bilious vomitings occurred, which relieved the chest and seemed to facilitate respiration; the same night some traces of blood were seen in the expectoration.

¹ Pravaz, *Recherches pour servir à l'histoire de la phthisie laryngée*. Paris, 6 Avril, 1824.

Hitherto the sputa have been thick and brownish. The last menstruation was on the 27th of December, and lasted two days. Since the invasion of the disease, the powers have gradually diminished; an emaciated condition had supplied the place of her usual embonpoint.

At the visit of the 1st of January, 1822, she offered the following symptoms:—Pain, referred to the sides of the neck, opposite to the great horns of the hyoid bone; slighter pain behind the sternum, and deep in the dorsal region, between the shoulders; increase of this pain when she coughs, swallows, or speaks, which last act is reduced to a whisper. Nothing was observed on the examination of the interior of the mouth, except some inequalities in the walls of the pharynx, without ulceration; respiration laborious and braying; greater facility in respiration when she is up, than when lying down; deglutition, accompanied by a sound like hiccough. Cough frequent, recurring almost every quarter of an hour, increased by drinks and efforts to speak, and producing a viscid, limpid matter, in which floated some masses of opaque mucus, streaked with blood; it was accompanied by a peculiar sound, which M. Fouquier compared to croup; so that by this character alone we should have been led to suspect an alteration of the larynx; there was pain in the ears and head; dyspnœa, amounting sometimes to suffocation, from the slightest causes; frequent, small, and hard pulse; night sweats; loss of appetite, and imperfect digestion.

For the first three days, barley water, milk, and soothing gargles were prescribed, with an opiate julep and pediluvia; suppuration was induced in the vesicated surface in front of the neck; the constipation was obstinate. On the 4th the blister was suppressed that another might be placed over the sternum; no change in the symptoms. 5th. Respiration is more difficult and hissing; constriction of the larynx; same prescription. 6th. Constipation continues, the dyspnœa increases, the larynx seems more constricted; sixteen leeches to be applied under the jaw. 7th. Bilious vomiting; some stools during the night; a grain of tartar emetic, gum water, and pediluvia were prescribed. Under this treatment, respiration became slower, easier, and less braying. There was a calm during the night. On the 8th, there was considerable oppression, pain behind the sternum, and redness of the face. The leeching was repeated; the diet consisted of four *bouillons* and a *lait de poule*; vomiting at night. 9th. The occlusion of the larynx is almost complete; inspiration is very difficult and noisy, orthopnœa, cough, extreme anxiety, and aphonia; at night, threatened suffocation and extreme agitation; all the symptoms increase. On the 10th, they had reached their greatest intensity; MM. Fouquier and Roux proposed tracheotomy, as the only resource. The trachea was scarcely opened, when a quantity of blood entered the canula, and prevented the access of the air to the lungs; the patient

fell senseless, the arteries ceased their pulsations, the countenance was pale, and the whole body cold; respiration was interrupted, the beating of the heart was no longer felt. The surgeon introduced an elastic tube into the trachea, and by repeated inspirations he succeeded in withdrawing part of the blood which obstructed the air-passages. The respiration was thus restored, and the circulation established, but the patient was still unconscious. The catheter was fixed by a riband round the neck, and the sufferer carried to bed. The rest of the day was passed with little hope; it was frequently necessary to clear the tube of viscid mucus. There were many fits of coughing. In the evening there was high fever, but respiration was less painful than before the operation.

The 11th, she had not yet recovered her consciousness; her drinks were given with a sick-cup (*biberon*). A silver canula was substituted for the elastic tube, but it gave the patient pain, and did not afford so good a passage to the air. On the 12th, the respiration was more free; she began to recognise persons around her; there was less fever; part of the air passed through the larynx; there was thirst and constipation. Gummed barley water and diet were prescribed.

The 13th and 14th, less fever; respiration easier, and more by the glottis than the canula. *Prescription*: Barley water with milk, gum water, opiate julep, *demi-crème de riz*, a *lait de poule*, and three *bouillons*.

The 15th. The wound began to contract, and no mucus passed; respiration was performed by the mouth; no more night sweats; sleep undisturbed. On the 16th, the pulse was rather frequent. The 17th, the speech was restored, when the finger was applied to the wound. 18th; pulse weaker, small, and not frequent: return of appetite: the wound is healing, and she can speak so as to be understood, without applying the finger. 19th; pulse scarcely frequent, respiration easy. 20th; some cough. 21st; scarcely any fever, constipation combated by injections: some nourishment was allowed. 22d; neither cough nor expectoration. 23d; the aphonia diminishing. After this, the pain in the throat disappeared, the strength returned, and cicatrisation progressed. 31st; very little air passed by the wound: the granulations were touched with nitrate of silver. She has appetite, the respiration is perfectly free, and she improves from day to day. On the 6th of February, the wound was nearly healed; the quantity of food was increased without any detriment. On the 14th, the fistula was closed, and the voice restored, but more dull than heretofore. She left the hospital with instructions to return occasionally, that a relapse might be observed.

Emily Bailly remained eight or ten days without any symptoms of disease: every thing induced the belief that the cure was permanent. She then came to M. Fouquier, complaining of difficulty of respiration, pain in the throat, pricking in this region, and

cough, general indisposition, and restlessness at night. She returned a second time, and as the symptoms were increasing, she was advised to come back to the hospital, which she did on the 1st of March. She then had a large pustule on the left commissure of her lips, partly ulcerated and partly covered with a crust which led to the suspicion of a syphilitic virus. Many other pustules were scattered over the scalp. From an investigation into the history of the case, it appeared that she had the venereal disease five years before, when she consulted M. Cullerier; that she had followed an appropriate treatment for some weeks, and until she supposed herself cured. These facts, in connection with the symptoms present, left no doubt of the nature of the disease, or that the laryngeal affection might be connected with it. The liquor of Van Swieten and the sudorific syrup were, therefore, administered. During the first week she was pretty well; on the 8th, she seemed to have recovered her voice partially, and the difficulty of respiration was diminished. On the 16th, the liquor and syrup were suspended on account of an increase in the cough: pills of Neapolitan ointment were substituted. This treatment seemed to suit very well at first. The pustule on the lip insensibly diminished, assumed a better aspect, and contracted. On the 18th, the voice reappeared, the oppression diminished, and there was less hissing during the inspiration.

20th. The voice was restored; there was a swelling of the right cheek, incipient salivation: twenty leeches under the jaw, cataplasms, gargles of marshmallow tea, gum potion,¹ and five *bouillons*.

22d. A purgative of manna; the ptyalism is excessive, with ulcerations in the mouth. 23d; vapour baths for the salivation. 25th; a purgative enema was added to the other remedies: the venereal symptoms had disappeared. 26th; the happy effects of the vapour bath on salivation were manifest. 28th; the swelling of the cheek had diminished. 29th; the salivation was subdued, she scarcely feels it, and on the 31st it was entirely arrested.

On the 5th of April the voice was re-established; she was able to

¹ *Gum potion.*

- ℞. Gummi acaciæ arab. grs. xvij.
 Infus. althææ comp. f ℥iv.
 Aquæ flor. aurant. ℥ij.
 Syrupi althææ f ℥ij. M.

Vid. Ratier's Formulary, Am. edit. p. 149.

Or,

- ℞. Gum. acac. ℥j.
 Aquæ f ℥ij.
 Syr. simp. ℥j.
 Aq. flor. aurant. ℥ij. M.

Vid. Ratier, p. 152.

resume the liquor of Van Swieten,¹ and the syrup of Cuisinier:² she continued to do very well. The symptoms of venereal infection and those of laryngeal alteration have disappeared. There was no cough or expectoration, no fever or sweats. Sleep was tranquil, the digestive functions resumed their activity, and her strength increased from day to day.

On the 12th of April, the menses appeared after an interval of many months. On the 13th, she would leave the hospital despite the representations which were made her of the uncertainty of her entire recovery. She promised to continue the use of mercurials for some time. Since this period, M. Truchon has frequently seen her. She has enjoyed uninterrupted good health.

Cancerous and tubercular laryngeal phthisis.—We shall not hazard any remarks upon the treatment of these species, which are evidently beyond the resources of our art. The only object we can propose, is to afford some palliation, and we are often obliged to practise tracheotomy upon the unfortunate patients, though it be only to prolong their sufferings.

Tracheotomy.—Whatever may be the form of laryngeal phthisis, when the tumefaction of the mucous membrane and submucous cellular tissue has gone so far as to prevent the entrance of a sufficient quantity of air into the lungs, death is threatened, if we do not open a passage to the air. Catheterism is the first mode which suggests itself to the mind, and Hippocrates³ proposed the introduction of tubes by the mouth. This plan was exclusively followed by physicians until Asclepiades, who first proposed the incision of the trachea, according to the method we shall presently describe.

Desault⁴ revived the plan of Hippocrates, which had fallen into disuse; but he asserts, that it is only practicable in cases of pharyngeal angina, when the inflammation has not invaded the larynx or trachea; for, besides the difficulty of introducing the tube through swollen tissues, its presence would cause an increased irritation. Boyer⁵ was therefore wrong in blaming this practice

¹ R. Hydr. bi-chloridi, grs. xvj.
Alcoholis, ʒss.
Aquæ destillatæ, ℥j. M.

Dose, half an ounce morning and evening, in milk, gum water, or syrup.

² R. Rad. sarsaparil. concisæ
Ligni guaiaci ras. aa. ℥j.
Aquæ fontana, ℥xij.
Sacchari
Mellis albi, aa. ℥ss. M.

Dose, two to four ounces.

From *Ratier's Formulary*, Am. ed. pp. 141 and 183.

³ De Morb., lib. iii., cap. 10.

⁴ Œuvres chirurgicales, tom. ii., pag. 251.

⁵ Traité des maladies chirurgicales, troisième édition, tom. vii. pag. 127.

of Desault, without adverting to the restrictions so judiciously adopted by the surgeon of Hôtel-Dieu.

We may here introduce some reflections which will convince our readers of its inutility.

First; the anatomical arrangement of the parts, and their respective curves, do not admit the introduction, and especially the maintenance in the larynx, of any other than flexible tubes, such as those of gum elastic. The nature of the case requires prompt action, lest death by asphyxia occur. If, then, too large a tube be used, there will be an obstacle to overcome, which will require time and not force; and if the end of the catheter be detained in the glottis for two minutes only, death would inevitably follow.

The tube must be of medium calibre, (No. 10 or 12 at most,) and the respiration being performed through the eyes of the instrument, a very little mucus may obstruct it; besides, its calibre is liable to be diminished by pressure against the obstacle in the larynx, by fits of coughing or vomiting, and by efforts of deglutition. We therefore entirely reject this plan, in laryngeal phthisis, and conclude that there is no better resource than opening the air passage.

Asclepiades was the first who recommended opening the trachea in extreme cases. Believing that the cartilaginous rings would not unite when cut, he proposed a transverse incision between them. Cœlius Aurelianus, who speaks of this operation, regarded it as quite chimerical and criminal. It has now been so often successfully performed, that we are surprised at the fears it excited in the minds of the ancients.

Before our times, tracheotomy had only been performed for acute diseases of the larynx, to extract foreign bodies, or for the sake of dressing wounds of the organ.

Desault was the first who made a clear exposé of the indications for the operation in laryngeal phthisis; but he never practised it. After him, almost all the physicians who wrote on œdema of the glottis, or chronic phlegmasia of the larynx, advised it as an extreme measure. At first, the operation did not succeed, because improperly performed. We have reported sixteen cases in this work, five of which were our own: vide Obs. I, XXXI, XVIII, LVI, and LVII: the others belong to MM. Fourney, XXII; Bulliard XXXIII bis, Roux LI, Lawrence LII, Marshall LIII, Porter LIV, Goodeve LV, Ch. Bell LVIII, Senn LIX, and Purdon LX and LXI.

The first case of introduction of a sound, to remedy an obstruction of the larynx, was reported by Mr. Goodeve,¹ who cited Price, who had worn a canula ten years, though he does not inform us what surgeon had introduced it; but it must have been anterior to the operations of Lawrence and Ch. Bell, who adopted the same expedient in 1815.

¹ London Med. and Physical Journal, July, 1826.

Let us here make a few observations on the mode of operating, and on some circumstances which have occurred in our experience. We have tracheotomised seventy-eight times; seventy-three for croup and five for laryngeal phthisis; and, therefore, have had occasion to modify the procedure and instruments.

We shall say nothing of the first steps of the operation, from the division of the skin until the cartilage is laid bare; only observing, that if the ligation or torsion of arteries be demanded, there is no necessity to secure the veins. These vessels often tear under the forceps or thread; at any rate, no harm results from cutting them, unless their calibre be great, in which case they should be avoided or tied. When the trachea is denuded, a puncture is made, and the finger instantly applied. As many rings are cut, above and below with a probe-pointed bistoury, as may be deemed necessary, and the finger instantly placed over the incision to prevent the blood from flowing into the trachea. Then seizing the dilator, which we have described in the second volume of the *Journal des Connaissances*, page 4, the finger is removed, and the instrument is rapidly introduced, and opened so as to separate the lips of the wound.

The patient is made to sit up, and the canula instantly introduced. It should be long, and of a large calibre; it immediately becomes an unyielding point of compression; and if the venous hemorrhage persists, which is a frequent occurrence in adults with this disease, the wound may be plugged as much as you please, without preventing free access of air by the canula.

If, on the other hand, we should wait for the venous hemorrhage to stop before we introduced the canula, it would be necessary to tie many vessels, which would require much time, and be almost impracticable; and in the mean time, an increase of the symptoms of asphyxia, and consequent continuance of venous hemorrhage, which is no doubt chiefly caused by the difficulty of respiration.

When all the accidents have been met, and the patient has expectorated all the blood that had got into the bronchia, he should be placed on his bed, the lips of the wound should be brought together above the canula and secured with adhesive straps, and a roller pierced with a hole for the canula.

The mucus which will accumulate in the canula must be removed; this is easily effected by a little horse-hair swab. The canula must be changed as often as the difficulty of respiration may indicate.

We shall now give some of the cases which prove how valuable a resource tracheotomy has been.

OBSERVATION LII.¹

David Jones, aged 53 years, who earns his livelihood by crying

¹ *Medico-chirurgical Transactions*, vol. vi., p. 250.

boxes and other articles about the streets, and had never been the subject of any similar attack before, became affected on Friday, June the 24th, with hoarseness, so that he spoke gruffly and with slight pain in the throat. He did not complain in other respects, though he thought proper to suspend his ordinary employment, fearing it might aggravate this hoarseness, and to take some opening medicine. On Friday, the 7th of July, he began to experience a difficulty of breathing, and, to use his wife's expression, to *hoop*; that is, to draw his breath with a peculiar sound. The voice was still more affected, and reduced to a kind of whisper. He was bled and purged on the 8th. At one in the morning of Wednesday the 12th, he again became much worse; the difficulty of fetching his breath was so great, that his wife said he was like a person running mad, not remaining quiet for a moment, but walking and moving about incessantly. Yet he particularly observed that this was his only grievance: and that if the stoppage in his throat could be removed, he should be well. He took an emetic, of which the operation rather relieved him; a very large blister was applied to the chest, and the whole throat was covered by another. The difficulty of breathing still increasing in spite of the full action of these blisters, and the danger of suffocation being extremely urgent, he was sent by Mrs. Parkinson, of Hoxton, to St. Bartholomew's Hospital, "where," says Mr. Lawrence, "I saw him at six in the evening. The distress of breathing was extreme; every inspiration performed with great effort, and the assistance of all the auxiliary powers was attended with a loud hooping noise, audible across the hospital square. He sat up in bed, shifting about incessantly to get breath, and agitated by the momentary expectation of suffocation; the occurrence of which, without some immediate relief, seemed close at hand. Sweat poured down in streams from the whole body; the pulse was 120, full, strong, and intermittent. He had no difficulty or pain in swallowing, and felt no inconvenience from fully distending the chest. There was a little coughing occasionally, excited by a colourless mucus about the larynx. Judging from the circumstances just detailed, that the affection was confined to the opening of the larynx, and the source of the patient's danger was a mechanical impediment to respiration, which bleeding and other evacuations, although fully justified by the state of the pulse, could not be expected to remove, I immediately determined on brouchetomy, receiving in this determination the sanction of my friends, Mr. Wheeler, the apothecary of the hospital, and Mr. Langstaff, who kindly favoured me with their assistance. I made a perpendicular incision, cut through the cricoid cartilage, and neighbouring part of the trachea, and removed a sufficient portion of these parts to leave a free opening for respiration. The blistered state of the skin, the depth of the parts in a short and thick neck, the rapid motions of the larynx, and the entrance of blood into the tube from vessels divided in exposing it, produced greater difficulties in the operation than a person would expect,

who formed his opinion from the ease with which it is accomplished in the dead subject. Two small arteries bled freely: one of them was tied, but the other could not be secured, on account of its lying completely under the edge of the cricoid cartilage; it was therefore left, the patient bending forward that the blood might not flow into the trachea. He breathed quite easily through the artificial opening; all the agitation and distress ceased; the skin became cool, and the pulse softer. Soon after he had some sleep, but did not rest well during the night. He took a saline mixture, with small doses of tartrate of antimony. The pulse was rapid and intermittent for two days, but there was no fever. Breathing was performed entirely through the wound, and the voice consequently was completely lost. There was a copious mucous and purulent discharge from the trachea and wound. On the 21st, he was sufficiently recovered to get up: by holding the edges of the wound together, he could breathe through the larynx and speak, but there was still a feeling of difficulty, which made it necessary to open the wound again in a short time. The 5th of August was the last day on which any air came through the wound, which had completely cicatrised on the 10th, when he was discharged from the hospital perfectly recovered, excepting that the voice still remained rough and hoarse."

It is difficult to decide, whether the case just stated properly belongs to laryngeal phthisis. Indeed, we see, in its rapid course, suffocation occurred quicker than it usually happens in simple laryngeal phthisis. Bayle would have regarded this case as belonging to *œdema of the glottis*. Inspiration was, indeed, more difficult than expiration, which was almost a pathognomonic character with him. This observation fully confirms what we said at the end of our paragraph on the connection between œdematous angina and laryngeal phthisis. From the beginning of the attack until the trachea was opened, colourless mucus flowed from the parts, but after the operation it was tinged with blood, and purulent. May we not conclude that the ulceration of the larynx was the result of the presumed œdema of the glottis?

OBSERVATION LIII.¹

Hoarseness.—Cough.—Dyspnœa.—Aphonia.—Dysphagia.—Imminent suffocation.—Tracheotomy.—Mercurial treatment, although there was no reason to suspect venereal taint.—Salivation.—Cure.

Mrs. Ann Hatton, aged fifty-three, of Barrow on the Soar, about fifteen miles from Nottingham, became affected in the latter part of September, 1817, with hoarseness and a hard dry cough. These two affections continued to augment in severity, without any additional symptom, during two months, when, about the 13th of November, a degree of difficulty in breathing, referred by the patient

¹ Medico-Chirurgical Transactions, vol. x.

to a "tightness in the throat," was superadded to them, and she discovered that she was unable to "snuff up" through the nose in inspiration, in the ordinary way. During two subsequent months, the hoarseness, cough, and dyspnœa continued and increased; and about the commencement of February, 1818, she began to experience, in addition, a degree of difficulty in swallowing. In the beginning of March she observed a swelling, rather diffused, but said to have been the size of a pigeon's egg, over the upper part of the thyroid cartilage, with an increase of the dyspnœa and dysphagia. A liniment was employed for this tumour, by which it was reduced in size, and the difficulty in breathing and swallowing diminished. In a short time, however, these symptoms again became aggravated, and they continued to augment until the month of August.

During the course of this affection, Mrs. Hatton constantly referred the seat of the difficulty of breathing to a tightness at the upper part of the larynx. She has always been affected with cough, accompanied by a peculiar, harsh, croupy sound in the throat; at first harsh and dry, but more recently attended with the expectoration of a viscid mucus, once tinged with blood. The dyspnœa has been constant, and lately much aggravated, precluding sleep, or putting a period to sleep by inducing a sense of impending suffocation, and rendering a raised position in bed absolutely necessary. Lately, too, she has suffered from fits of increased dyspnœa, threatening suffocation, obliging her to run for relief to the open window, and causing great anxiety and urgent distress.

"Mrs. H. applied to me," says Marshall, "on the 15th of August, 1818. She was then affected with a degree of hoarseness which rendered the voice nearly inaudible. There was a perpetual dyspnœa referred by the patient, by the noise in breathing, and by the sound of the cough, to the upper part of the larynx. She swallowed with great difficulty and effort. There was an obvious general tumefaction of the parts about the larynx, occupying the left rather more than the right side. She stated that she had experienced great difficulty in walking up a hill, or pair of stairs. She described the impossibility of snuffing up the nostrils, an effect, I suppose, of the partial closure of the larynx; for to produce this snuffing, it is necessary that a certain *quantity* of air should be drawn through the nostrils with a certain *velocity*; and, in the present instance, the *quantity* of air admitted appears to have been too small. The patient experienced increased uneasiness on drawing the head backwards. A bougie was passed into the œsophagus, but met with no resistance.

On the 15th, I recommended five grains of the pil. hydrarg. to be taken every night and morning, half an ounce of the sulphate of magnesia, twice in the week; four leeches to be applied over the larynx every other day, and a lotion constantly when the leech-bites were not bleeding.

On the 22d I again saw Mrs. H. The symptoms were unabated.

The mercurial had produced no effect on the gums. Mrs. H. was now induced to remain a short time in Nottingham. There was a degree of emaciation and debility; the pulse was rather frequent and feeble; the appetite impaired. The pil. hydrarg. was continued three times a day.

"On the evening of the 24th, Mrs. H. was seized with an alarming fit of dyspnœa, to which I was witness. There was the greatest anxiety of countenance and manner; in the breathing, every auxiliary muscle of respiration was called into action, and there was every appearance of impending suffocation. The dyspnœa had abated somewhat in violence, and there had been similar fits of dyspnœa before, or I should have immediately recommended the operation of laryngotomy. The difficulty of breathing abated gradually, and I left my patient in her usual state of dyspnœa.

"In consultation with Mr. Oldknow, a most skilful surgeon of this town, it was concluded that the operation of laryngotomy was necessary to avert the danger of suffocation, incurred during the fits of dyspnœa. The operation was therefore performed on the 25th instant, and I am obliged to Mr. Oldknow for the following account of it.

"An incision was made through the integuments, beginning a little above the thyroid, and terminating a little below the cricoid cartilages. The external surfaces of these cartilages were then exposed, partly by incision, partly by the finger. An opening was then made into the larynx, a little below the most prominent part of the thyroid cartilage, and extended downwards to the upper margin of the cricoid cartilage. This incision not being sufficient for respiration, a crucial incision was next made through the membranous connection of the two cartilages; but still with an unsatisfactory result, for the breathing was performed only in part, and with great difficulty, through the aperture thus made. A circular portion, about one-eighth of an inch in diameter, was therefore removed from the lower and lateral part of the thyroid cartilage, when the respiration became perfectly free, and the patient experienced the greatest possible relief. The cut edges of the integuments were kept asunder by straps of adhesive plaster, passed from them towards the nape of the neck.

"*Remarks.*—This operation was rendered more difficult than might have been expected, from the impossibility of the patient's reclining the head *backwards*, this position inducing greater dyspnœa. The larynx could not, therefore, be brought sufficiently forwards, and the depth of the incision was necessarily greater than was contemplated. The upper part of the thyroid gland, which appeared to reach higher than usual, was exposed. This gland was nearly in contact with the cricoid cartilage, so that an opening could not have been made through the upper ring of the trachea, without danger of wounding the gland and causing hemorrhage.

"It may be said, that an opening made so high in the larynx, as

in the present instance, is injudicious: first, on account of its affording less decided relief to the respiration, if there be extensive disease; and, secondly, on account of the danger of wounding the vocal cords. With regard to the first objection, the decisive relief afforded to respiration, in the present instance, at least, is a sufficient answer. With respect to the second, if care be taken to remove a part of the thyroid cartilage, to the extent above specified, from the inferior and lateral part of this cartilage, no injury will be inflicted on the vocal cords, their anterior attachment being nearly opposite to the most prominent and central part of the cartilage.

"On the other hand, the advantages of a permanent opening, thus induced, are very considerable, especially when we consider the impossibility frequently experienced, of employing a tube to insure the same effect. In the present case, the introduction of a probe, merely, induced the most distressing fits of convulsive coughing.

"This operation afforded immediate relief to the respiration, and Mrs. H. slept soundly through the ensuing night, for the first time for a long period. Deglutition continued difficult, and always induced coughing during the five or six subsequent days. The cough raised some viscid mucus, which was forced through the orifice made by the operation. The voice was quite lost.

"On the day of the operation, the pil. hydrarg. was omitted, and the ung. hydrarg. was prescribed to be rubbed in, in the quantity of half a dram, morning and evening. The ol. ricin. was ordered to open the bowels.

"On the 28th, the mouth became sore. Mrs. H. soon afterwards experienced a mitigation of the difficulty in swallowing, and on applying the finger to the opening into the larynx, she found, in a short time, that the tightness in the respiration was also diminished, and that she could breathe with greater facility than before the operation, and, as she expresses it, more freely through the nose.

"This amendment continued progressive; and, on the 15th of September, the orifice into the larynx so far closed, after an attack of sickness and retching, induced by the ol. ricini, that the air only passed through it during respiration. On the 11th, the orifice closed finally; the respiration, however, was free, the swallowing easy, and there was a slight return of voice even. On the 13th, I again heard from Mrs. H., who had returned to Barrow; the amendment continued; the mouth was extremely sore. The ung. hydrarg. was ordered to be used sparingly.

"On the 22d, I paid Mrs. H. a visit. She was sitting up in bed. She breathed with perfect freedom, and had had no paroxysms of augmented dyspnœa since the time of the operation; she swallowed without uneasiness or effort, and, as she said, as well as ever; the whisper had advanced to a hoarse voice; and she could snuff up the nose with the usual force. Speaking, however, still required much effort, from the remaining hoarseness; and in swallowing, the skin just above the cicatrix was drawn into wrinkles, being

raised by its adhesion to the thyroid cartilage. The tumefaction about the larynx had entirely disappeared. There was scarcely any cough, and but the scanty expectoration of a little mucus. The general appearance, strength, and appetite were improved. She could lie down, and sleep the night through. The mouth was better, but still affected by the mercury.

"Oct. 27th. Soon after the date of the last report, Mrs. Hatton imprudently left her bed-room, and exposed herself to the draughts of air in a room with three doors. She appeared to take cold in consequence, and a degree of difficulty of deglutition, and a loss of the voice formerly regained, was the effect. She came once more to Nottingham; she was once more put upon a course of ung. hydrarg.; and, in proportion as this remedy induced ptyalism, the dysphagia disappeared entirely, and the voice became again improved. To-day, two months after the operation, she only suffers from the effect of the mercury on the mouth; the respiration and the swallowing are quite natural, and the general health and appetite are good. She returns home, with the recommendation to continue the use of the ung. hydrarg. for a time, to put on flannel, and cautiously to avoid exposure to cold.

"This state of amendment still continued on the 16th of December, and on the 8th of January, 1819, when Mr. H. called to give the most satisfactory account of his wife's recovery and general health."

OBSERVATION LIV.¹

Exposure to cold.—Hoarseness.—Dyspnœa.—Bleeding, blisters, and purgatives, without effect.—Emetics.—Slight improvement.—After six weeks, impending suffocation.—Tracheotomy.—Mercurials to salivation.—Cure.

On entering the Meath Hospital on the morning of the 2d of February, I was informed—says Mr. Porter—that a person, named Michael O'Neil, had come to the institution, labouring under excessive difficulty of breathing, and was waiting for assistance: indeed, it required little discrimination to point out the nature of the case, for, at the distance of several yards, I could distinctly hear the sibilous whistling noise peculiar to the breathing of persons suffering from *cynanche laryngea*. Without delay, therefore, I commenced an examination of the case.

He appeared to be a man of about thirty years of age, strong and well formed, but with a slight stoop. His face was pale and swollen; his lips livid; he sat with his mouth closed, but his nostrils widely extended; his eyes seemed protruded and starting from their sockets, but, at the same time, the conjunctiva appeared very white, and covered with a watery suffusion. There was, altogether, an expression of indescribable anxiety in his counte-

¹ Medico-Chirurgical Transactions, 1821, vol. xi. p. 414. Treated by Wm. H. Porter.

nance; his pulse was hurried, but not irregular; his breathing very laborious; he made two, three, and even more attempts at inspiration for one expiration, and his muscular heavings and convulsive struggles for breath were truly painful to behold. He breathed with a peculiar hissing or whistling sound, giving a distinct idea of the forcible passage of air through a contracted aperture, and he had almost lost his voice, the utmost endeavour at speech amounting only to an indistinct whisper. On being questioned as to the seat of his uneasiness, he pointed to the situation of the larynx, and even appeared to feel pain on this part being pressed externally. On account of the great difficulty of breathing, it was impossible to place the patient in a position such as would allow an examination of the state of the fauces; but what could be seen exhibited no mark whatever of the existence of inflammation; and it afterwards appeared, from the patient's own account of himself, that at no time did he experience the smallest impediment to deglutition.

It was extremely difficult, from the patient's inability to speak, to gain any information as to the duration of the disease. At first, I was led to understand that it had occurred only that morning; and, afterwards, he seemed to say he had been ill for five weeks; so, not knowing what to believe, and being guided chiefly by the urgency of the symptoms, I immediately ordered that he should have a bolus containing ten grains of the submuriate of mercury, and that a large quantity of blood should be taken from the arm. The veins of both arms were opened at once, and between thirty and forty ounces of blood were abstracted while the patient sat erect; yet, to the moment before the flow of blood was stopped, he exhibited scarcely a symptom of weakness, and the difficulty of breathing was not at all alleviated. Feeling now that any other mode of treatment, directed to the removal of inflammation, would afford but a slender prospect of relief, and that, under existing circumstances, the life of the patient could not endure many hours, it was resolved that the operation of tracheotomy should be performed with as little delay as possible.

In about two hours afterwards, (a delay which unavoidable circumstances rendered necessary,) I returned to the hospital to perform the operation, and found the patient labouring under circumstances peculiarly unfavourable, considering so short an interval had elapsed. There was scarcely a pulse to be felt at the wrist; his extremities were cold; he lay on his back almost insensible, and seemed sinking with amazing rapidity. There was now not a moment to be lost; and, with a view of disturbing the patient as little as possible, I resolved that he should not be carried from the ward; and, having had the bed removed to such a position as afforded the most favourable light, I performed the operation, assisted by my friends, Messrs. R. M'Namara and T. Roney.

An incision was made nearly three inches in length, commencing a little above the cricoid cartilage, and continued towards the

sternum, dividing the skin and cellular substance down to the muscles. At this period of the operation, two small lymphatic glands were exposed, which protruded forwards, and, interrupting the view of the parts, were cut away. The incision was then carried deeper, still preserving the central line of the neck, until a fascia covering the trachea was exposed; and here lay the greatest difficulty of the operation. The trachea was moved upwards and downwards behind this fascia, according to the patient's exertions to breathe, and it was impossible to open it satisfactorily until this membrane was completely removed, a proceeding that occupied some time. It was, however, effected: the trachea was laid bare, in extent about three-fourths of an inch, and a circular portion removed, the diameter of which might have been one-fourth of an inch. At the moment the bistoury was passed into the trachea, and the external air admitted, the patient seemed to experience an almost immediate change. He had before lain perfectly quiet, had scarcely winced under the knife, and appeared nearly insensible; he now raised himself suddenly in the bed, and coughed with some violence. In a moment, however, he laid down again, and the operation was completed; a silver tube was introduced into the aperture, and retained there by tapes passed through the rings attached to it. It is impossible to conceive any thing more instantaneous, or more complete than the relief afforded by the operation. He now breathed freely through the wound; the convulsive muscular heaving ceased altogether, and the acts of inspiration and expiration were performed in regular and healthy alternations. I regret that I did not examine the state of the pulse after the operation, to ascertain if the restoration of respiration had any effect in altering its character.

It is to be remarked, that all the steps of this operation occupied but a few minutes, and though I believe the central slip, connecting the two lobes of the thyroid gland, (which in this place must have been very small,) was completely divided, there was scarcely any hæmorrhage: there was some from the superficial veins; but, in all, it did not amount to more than two or three ounces.

The patient's bed was now rolled back into its place, and as he seemed greatly exhausted, warm wine and water were administered; his feet were wrapped in flannel; warm bricks were applied to them; and having prescribed another bolus, containing ten grains of the submuriate of mercury, I left him under the care of two intelligent pupils.

On visiting the patient in the evening, I found he had had some sleep during the day, and was lying quietly, but extremely weak; his breathing was regular, and through the wound; his pulse about one hundred and ten, but so small as scarcely to be felt under the finger. He had expectorated a small quantity of mucus through the cannula. On being questioned as to his feelings, he wrote on a slate that he was wonderfully relieved. He now got ten grains more of the submuriate, making in all half a dram in the course of

the day; and a purgative enema was directed to be administered in a short time, if the bowels were not previously freed.

February 3d. He had slept pretty well during the night, and had five or six stools, after the administration of the enema; but towards morning, respiration became again, in some degree, impeded, and when I visited him, he breathed with nearly the same sibilous hissing noise as before the operation. On examination, I found the tube had slipped out, and the size of the opening into the trachea was greatly diminished, from its edges being covered with inspissated mucus; this was cleared away with the end of a probe, and as the canula was found too short, a longer one was introduced. The patient now felt comparatively comfortable, and expressed his sense of relief by signs. Pulse one hundred and ten, but still extremely feeble, and his extremities had not yet recovered their natural warmth. His allowance of warm wine and water was therefore continued, and he had half a dram of the submuriate of mercury in three separate divided doses on this day also.

Feb. 4th. He had slept tolerably well on the preceding night, but had one or two attacks of convulsive breathing from the wound being obstructed. Pulse one hundred, something fuller and soft; his bowels were free, but his breathing still obstructed by inspissated mucus, and he was sometimes obliged to resort to the natural opening of the larynx, and to use strong muscular exertions in inspiration, although in a far minor degree to what occurred previous to the operation. The wound required to be kept constantly clean in order to prevent these attacks of obstructed respiration, and the patient was greatly teased with the quantity of mucus that accumulated in the throat, and which he was obliged to expel through the wound. The expression of his countenance was much altered. He had lost all the wildness and anxiety that formerly characterised it, and the livid, swollen appearance of the cheeks and lips had been completely removed. He still remained very weak, and had warm wine and water as usual. He took this day a scruple of the submuriate in two equally divided doses.

Feb. 5th. Had rested well, and had four evacuations from his bowels; pulse one hundred, and soft; appetite good; he asked for food, but could not be indulged to the extent of his wishes. His mouth was sore from the use of mercury, and there was strong mercurial fætor from it. He breathed partly through the wound, and partly through the rima glottidis, but without much noise, or any muscular exertion. On placing a finger on the wound, so as to close the artificial opening, the amendment in his breathing became very apparent, and he could make a good attempt to speak. He had no cough, and in consequence of the mercury taking effect on his mouth, the large quantity was laid aside, and pills containing two grains each, combined with antimonial powder and opium, were ordered to be taken three times a day.

Feb. 6th. Patient appeared very drowsy, seemingly from the effect of the opium he had taken, but signified that he was much

better ; had slept very well during the night, and had three evacuations from the bowels ; pulse one hundred and two, soft, rather fuller. He breathed entirely through the wound, but the passage of air was accompanied by a hissing sound, in consequence of the edges of the opening into the trachea being covered with inspissated mucus, which required to be cleared away every two or three hours. In order to remedy this inconvenience, I resolved on enlarging the opening, and removed another portion of the trachea, which left the aperture three-eighths of an inch long, measuring from above. After this, there was no further trouble in cleaning the wound, and the patient lay perfectly quiet, breathing with great ease, and expectorating freely through the wound.

On visiting the patient in the evening the advantage of having enlarged the opening was very apparent. There was not the least expression of anxiety or uneasiness in the countenance. His breathing was free ; pulse full and soft ; he had no cough ; his appetite so good, that he had chicken this day. He wrote on a slate that he had experienced the greatest relief.

Feb. 7th. Had slept extremely well, and the drowsiness observed on the preceding day, had not entirely gone off ; pulse 100 ; breathing very free, and without the smallest noise. The wound now discharged healthy pus in moderate quantity, some of which occasionally falling into the trachea excited cough, but he expectorated freely by the wound. The expression of his countenance was greatly improved, his complexion had partly returned, and his sister who attended him, said, that he appeared now nearly the same as before his illness. His mouth was very sore, and the ptyalism profuse.

Feb. 8th. He had slept well, and was much better ; breathed without any difficulty through the wound ; coughed a little from pus getting into the trachea, but expectorated freely ; pulse 96 ; his mouth very sore, with a good deal of ptyalism, but not the slightest uneasiness in the situation of the larynx.

Feb. 9th. (8th day.) The patient's mouth was very sore, but in other respects he was rapidly improving ; pulse 86 ; breathing very free through the wound. On placing my finger on the aperture in the trachea he spoke in a full, clear, deep tone, and said that all uneasiness was completely removed.

After this day I made no report of the state of the patient, unless that he was recovering rapidly. His mouth continued for some days excessively sore, and there was profuse ptyalism ; to relieve which, he had some saline purges with the best effect ; and as the irritation continued in his mouth, and his jaws were greatly swollen, it was deemed right not to unite the external wound until these symptoms were abated, particularly as its remaining open did not produce any inconvenience. It was, however, completely united on the 22d of February : the patient was up, walking about the ward, and apparently in as good health as at any period of his life. He subsequently left the hospital on the 3d of March, and as I have

seen him frequently since, I am satisfied not only of his entire, but permanent recovery.

When this poor man had completely recovered, I endeavoured to ascertain from himself an accurate history of the case previous to his application at the Meath Hospital; and the following is the account he gave.—It was on the 16th of December he first perceived a hoarseness in his voice, which seemed to have come on without any apparent cause; he had not committed any excess, nor exposed himself in any way to cold. This hoarseness lasted for ten days, but was unaccompanied throughout with difficulty of deglutition; soon after Christmas, the breathing became greatly obstructed, and then the distress he experienced drove him to seek relief at different charitable institutions. He had been bled and blistered at one, without the smallest benefit. He was twice bled at another, without relief. He applied to two private practitioners, from one of whom he got a great quantity of purgative and nauseating medicines, the latter of which relieved him more than any thing else; by the other he was ordered to apply blisters twice. On the very day before he came to the hospital, there were three blisters, in different situations; and as he observed that he was always much worse after their use, he attributed the great exacerbation of the disease to this circumstance. On the night before he came to the hospital, he felt a pain in the chest so severe as to prevent his lying down in bed, which continued all night and the next morning, until removed by the copious bleeding. Previous to the attack of cynanche laryngea, he always imagined that he had bad lungs, he breathed short, and could not walk more than a mile without much distress. He had always a thick unpleasant sensation whilst speaking, and he says now that all these inconveniences are removed, and that he is really better than ever he was before; probably the comparative comfort he feels now, with what he experienced for seven or eight weeks previous to the operation, makes him exaggerate the real relief he obtained from it.

OBSERVATION LV.¹

Ulceration of the larynx and trachea—Impending suffocation—Tracheotomy—Cure.

A man of thirty-six had ulcers in his throat at different times, which were suspected to be venereal. The inflammation had invaded the larynx, and there was difficulty of breathing and much hoarseness. A blister and leeches were applied, with a course of mercury, and the symptoms yielded in part. Still, the patient, in a violent fit of suffocation, expelled from the larynx a piece of bone supposed to be a fragment of the sternum, at the upper part of

¹ Related by Dr. Goodeve, *London Medical and Physical Journal*, July, 1826.

which there had been an inflammatory swelling.¹ The respiration and voice became freer, and the patient appeared cured. But the suffocation soon returned, and became so threatening, that Dr. Goodeve thought it necessary to practise tracheotomy: the patient was almost dead with asphyxia. An opening of six lines was made into the trachea, which caused the difficulty of respiration to cease immediately, and at the end of twenty minutes a gum elastic canula was introduced, which at first caused violent irritation and much cough, with expulsion of bloody mucus: but these accidents ceased at the end of an hour. The patient wore the canula for six months, after which he was entirely cured without alteration of the voice.

Mr. Goodeve observes that this is the second case he had met in which a canula had been introduced into the trachea to be worn permanently, and relates that Price carried one for ten years without inconvenience.

OBSERVATION LVI.

Chronic laryngitis for four years and a half—Imminent suffocation—Tracheotomy—Introduction of a permanent canula—Respiration established—After seven months difficulty of deglutition and respiration—Development of a tumour in the back part of the trachea—Death from inanition eight months after the operation.

Mary Ann Milet, aged sixty years, having a robust constitution and great spirit, conducted a large farming establishment for thirty years.

In January, 1831, she was attacked with fits of dry cough, during which she had involuntary emissions of urine: the fits first occurred at considerable intervals, then every day, and finally several times a day.

January, 1833, she lost her voice; it returned towards the end of February. About the middle of January, 1834, her voice was again changed, and grew worse until July, when there was complete aphonia.

She did not determine to take advice until September, when a blister was applied to her left arm and continued two months. In November ten leeches were applied to the neck: a few days afterwards a blister was placed on either side of the larynx and kept open two or three months; and in January, 1835, a seton was introduced in the nucha.

On the 29th of January, M. Andral diagnosticated chronic laryngitis, and suspected pulmonary emphysema.

The disease still progressed, the fits of cough were accompanied with an insupportable sense of scraping in the throat, and were

¹ There is every reason to believe that this fragment was part of one of the rings of the trachea or cartilages of the larynx.—(*Note of the authors.*)

sometimes followed by obstinate sneezing. The cough was somewhat soothed by a draught of water.

Towards the middle of December, 1834, respiration was, for the first time, difficult, then laborious, hissing and hurried. Insomnolence; the horizontal position increased the oppression, and was soon impracticable. Dyspnœa became so great, on the 22d of February, 1835, that asphyxia appeared imminent.

On the 23d of February we opened the trachea, and introduced a large canula. All effort in respiration immediately ceased, the air entered the lungs without any difficulty. From this period until the 5th of May, when we discontinued our visits, respiration was completely established by the artificial opening.

Some months later, she was doing very well, deglutition was easy, respiration without any difficulty; but when the canula was removed, or closed, it was evident that the larynx was impervious.

In September, 1835, nearly seven months after the operation, deglutition became difficult, and respiration obstructed, nor could it be re-established by the canula which was too short. From this time we suspected a tumour at the posterior part of the larynx.

This suspicion was but too well founded. Gradually, solid or liquid food passed with difficulty, and at length could not reach the stomach, and the unhappy woman died of hunger and thirst towards the end of October, 1835.

The autopsy was not made.

OBSERVATION LVII.

Hoarseness—Dyspnœa—Fits of suffocation—Approaching death—Laryngo tracheotomy—Amendment—Introduction of a permanent canula—Death ten months after the operation.

Dr. Evrat, a distinguished accoucheur, had arrived at the age of seventy without any infirmity. His voice was clear and very agreeable.

On the 1st of January, 1833, he had to go to Versailles in the night to attend an accouchement, when he contracted a hoarseness that no remedies could modify.

He had no oppression, very little cough, and no expectoration; his general health continued excellent.

Complete aphonia came on in November, 1834. On the 20th of January, 1835, he had a fit of *asthma* in the night, and from that time ceased pursuing his profession.

He could not sleep, unless supported by pillows, and was finally obliged to spend most of the night sitting up in bed.

Thus far he had scarcely complained of his situation, and thought it was only an attack of asthma, because he had a remission during the day.

But on the 3d of February extreme orthopnœa obliged him to apply leeches, which did not hinder the suffocation from becoming imminent.

We were then called to the patient, and met in consultation Professors Moreau, Roux, Dubois, senr., and Chomel. Death was at hand, and tracheotomy was considered the only resource. The patient united in this view, and insisted upon the operation.

On the 5th, at 2 P. M., we practised laryngo-tracheotomy; that is to say, we cut the crico-thyroid space, the cricoid cartilage, and two rings of the trachea.

Convalescence was rapid, but the larynx appeared completely obliterated eight or ten days after the operation. Deglutition continued difficult; drinks, and crumbs of food, provoked insupportable fits of coughing.

He recovered his breath, and bore the canula pretty well; but grew emaciated in consequence of insufficient alimentation.

Finally, in November, 1835, ten months after the operation, he was carried off by dysentery, without any symptom in the respiration, in the sounds of his thorax, or the nature of his expectoration, that induced M. Chomel to suspect the existence of a pulmonary lesion.

Three months before death, a little tumour was developed above the canula, from which there was frequent hemorrhage, that gave it the appearance of cancer. It increased or diminished in consequence of the irritation caused by the canula; when we used a longer one, it almost disappeared, and we did not then think it cancerous, but supposed that the thyroid body, which had been cut in the operation, was irritated by the canula, and thereby hypertrophied.

We should also state that three months before his death, M. Evrat coughed up a piece of bone, which could be nothing else than an ossified and necrosed portion of cartilage. Could this necrosis have been caused by the presence of the canula, which rubbed against the cricoid cartilage, or was it produced by the same organic lesion that first brought on aphonia, and afterwards suffocation? This fact could only be ascertained by autopsic examination, which was not made, although M. E. had authorised it in his will.

OBSERVATION LVIII.¹

Chronic laryngitis for several months—Imminent suffocation—Tracheotomy—Death a month after the operation—Thickening of the mucous membrane of the larynx and epiglottis—Caries of the thyroid cartilage—Trachea and lungs healthy.

On Tuesday, the 1st of August, among the patients who presented themselves for admission at the Middlesex Hospital, was Hannah Donovan, æt. 34. She was seated upon the ground, with

¹ Medico-chirurgical Transactions, vol. vi. p. 253. Communicated by Dr. P. Latham.

a number of her friends standing around her, who fancied she was dying. She was breathing with great labour, and with a hoarse and croaking sound, audible to a considerable distance; and in her countenance she exhibited much distress. When interrogated respecting her complaint, she answered with difficulty, and in a voice interrupted by convulsive catches; not being able, without some effort, to obtain breath sufficient to articulate. She referred to her chest, and particularly to the upper part of the sternum, as the situation where she felt great oppression; and being desired to place her finger on that part of the throat where she felt pain, she laid it on the thyroid cartilage. She could swallow fluid only in the smallest quantity at once, and with great difficulty; of solid food she had taken none for some days. Respecting the history of her complaint, it was not easy to obtain a satisfactory account; for she and her friends were of the low Irish, and each gave a different answer to most of the questions that were proposed to them. Thus far, however, they seemed tolerably agreed, that she had been hoarse during some months; that she had been worse during the last three weeks, and that the symptoms had subsisted almost in their present severity during three days. Her pulse was full and strong, and 112 in a minute; she had considerable heat of skin, probably owing to the exertion she had made, for it could not be regarded as the heat of fever, inasmuch as the tongue was perfectly clean, which was probably a sufficient evidence that the disorder was not of the acute kind. Not the least appearance of inflammation or tumefaction was discernible, either in the tonsils, or any part of the internal fauces within view. Upon the whole, however, it was thought best to take blood from the arm, to apply a dozen leeches to the throat, and afterwards a blister; to order some purgative medicine to be taken immediately, and small doses of calomel, antimony, and digitalis, every four hours. Before the prescribed quantity of blood was taken from the arm, she fainted, and in the act of recovering she vomited, and seemed somewhat relieved. In the evening, the blood that had been taken, the operation of the purgative medicine, and one dose of the powders, had in no degree relieved the symptoms. She seemed to be using all her efforts to prevent strangulation. Her strength, however, had not visibly declined since the morning; her pulse was not diminished in force, or increased in frequency; nevertheless, considering that the symptoms were not such as to characterise acute inflammation, I saw no warrant—says Dr. Latham—for taking more blood from the constitution, and contented myself with an attempt to render more tolerable the distressful symptoms of a disorder which seemed beyond the possibility of cure. With this view the patient was ordered to take thirty drops of the tincture of opium, and those in attendance were enjoined to repeat the same dose two or three times more during the night, if it seemed necessary.

On Wednesday morning she was almost exhausted by the labour of respiration. She had been delirious during the night, and had

obtained no rest. Her countenance was become pale, and its expression of anxiety much increased. The pulse was weaker and more frequent, and her ability to articulate was almost gone. Under these circumstances the operation of bronchotomy seemed to present itself as the only method whereby the patient could be rescued from certain death, and with this view I could not satisfy myself without pressing its adoption. At a consultation, however, in the course of the day, the medical gentlemen of the hospital did not deem it advisable. I saw her in the evening, when it was to all appearance probable that she would die in the course of the night. On Thursday morning I came early to the hospital to enquire the state of my patient, and found that Mr. Charles Bell had in the night performed the operation, and that she was still alive.

The operation consisted in a division of the cricoid cartilage in front, and no sooner was it completed than she seemed at once released from an insufferable load of misery. Her head sank backwards, and she fell into a profound sleep so instantaneously, that she was at first thought to be dead: whence it may be calculated how near she had approached to the last degree of exhaustion, and how great was the relief afforded by the operation. The patient, it was hoped, was now placed in a condition to endure her disease, while it passed through the natural process of its reparation and decline, if fortunately it should be in its nature remediable.

After the operation, however, a difficulty presented itself in the adaptation of an instrument to keep the edges of the wound asunder. The insertion of a tube was quickly found to be impracticable, and a silver wire bent into accommodation with the sides of the aperture served as a temporary expedient, until one more suitable was devised. The instrument employed afterwards consisted of two branches connected by a hinge, and of a flattened figure; these were inserted in the wound of the external parts, and separated from each other, or approximated by means of a screw, which passed through their extremities out of the wound. When the ends in the wound were separated, the sides of the incision were kept asunder, and the instrument remained fixed in its place: by approximating them it became loose and could be removed.

During many days the state of the patient was too precarious to allow the most sanguine to cherish an expectation of her recovery. The matter which was perpetually accumulated in the aperture, and the constant necessity of cleansing the wound, and of withdrawing and reinserting the instrument, unavoidably produced and maintained the severest irritation and pain. Under these circumstances she was at intervals reduced for a time to the same degree of suffering as previously to the operation. For the mucus, which was secreted with the greatest rapidity in the bronchia, and raised by the cough into the larynx, adhered to the instrument and to the edges of the wound, and served to diminish and almost to occlude the aperture. Hence a severe struggle commenced to overcome the obstacle which plainly threatened strangulation. These pa-

roxysms returned at first several times in an hour; and as the secretion of mucus was diminished, less frequently. But to the last they continued to recur at more distant intervals, and occasioned such terror and perplexity to the patient as to fill her with an apprehension of death every time they returned.

After the lapse of a fortnight, although there was little abatement of the severity of the occasional paroxysms, her constitution was less under the influence of permanent irritation. She began to believe it possible that she might recover; her mind became more tranquil, and her countenance cheerful; she enjoyed sound repose; and when the trachea was not obstructed with mucus, and the aperture was free, her respiration was almost inaudible. Her favourite posture, in which she seemed to have the greatest comfort from facility of respiration when awake, and in which she was always observed to sleep, was that wherein the trunk is bent forward upon the knees, and the head reposes upon the support of the hands.

At the completion of the second fortnight it was time to expect some evidence of progressive amendment in the disease of the larynx. But this organ had not at all resumed its functions, and if any change had taken place in the disease, it was probably for the worse. She was still unable to articulate; and when the aperture was closed she struggled for breath. Besides, she had become generally more irritable; she had suffered more severely from tightness and oppression across the chest, which was relieved for a time by blisters, and then quickly returned. Expectorant medicines brought little alleviation, and short intervals of ease were purchased by long struggling to rid herself of that which seemed to threaten her life. Her existence was certainly prolonged during many days by the assiduity and attention of Mr. Heath, the apothecary of the house, who was hourly present with her; and who, during her paroxysms, by means of a probe, covered at the point with cotton, cleared away the mucus that entangled itself with the instrument, and thus set her respiration free. On the night of the 11th of September she was seen struggling in a severe paroxysm, and before assistance could be procured she expired. The lungs were inflated, and every other method was employed which was calculated to resuscitate suspended animation, in vain.

Upon dissection, the mucous membrane, where it lines the larynx, and extends over half the posterior surface of the epiglottis above, and to about an inch beyond the cricoid cartilage below, had assumed for the most part a thick and puckered condition, and had partially thrown out coagulable lymph of a stringy and fibrinated texture, which obliterated the ventricles of the larynx, and contributed almost to close the rima glottidis. There were found, besides, two ulcerations through the substance of the thyroid cartilage, which contained pus and communicated with the cavity of the larynx. The lungs, trachea, and its ramifications, were healthy; the opening into the larynx was a little on the left of the

tube, just below the thyroid cartilage, and on the upper edge of the thyroid gland; which latter seemed to have been slightly included in the incision.

OBSERVATION LIX.

Chronic laryngitis—Tracheotomy—Cure.

The Journal of the Progress of Medical Sciences, vol. v. p. 226, (1829,) contains an account of a tracheotomy, after which the patient wore a canula in the trachea eleven months, during which time the affection of the larynx was perfectly cured.

This observation, published by Dr. Senn, of Geneva, was read at the Institute, and furnished the topic of a report from MM. Dupuytren and Duméril, on the 10th of December, 1827. We have considered it worth transcribing:—

“Maria Vonan, aged six years, of small size and lymphatic temperament,” says Dr. Senn, “was brought to me by her mother on the 22d of August, 1826. This intelligent and gentle child had been treated for croup eighteen months previously by Dr. Gosse. Since then, she has always had a weak voice, and difficult respiration and deglutition. I found her in the following condition:—

“Decided emaciation; braying; hissing; half aphonic respiration; the thyroid gland double its usual size. Exploring the chest, I find the sounds every where sufficiently clear, and the hissing appears to exist in the larynx or upper part of the trachea. The digestive functions are well performed.

“I had just heard in our medical society, a very interesting memoir by Dr. Prevost, who related many cases of little goîtres pressing the trachea so as to cause fatigue of the inspiratory muscles, and a cough very much like that of incipient phthisis.

“Thinking it was a case of this kind, I put the child on the following treatment:—Pure bread and milk diet; a tenth of a grain of hydriodate of potash in sweetened water, to be taken twice in twenty-four hours; and half a dram of the hydriodate ointment to be rubbed on the axilla every night. I need hardly say that a milk diet was adopted to prevent the frequently troublesome action of preparations of iodine on the digestive apparatus.

“Three weeks of this treatment sufficed to reduce the thyroid gland to its natural volume. The child gained flesh; respiration and deglutition became easy, but there was little change in the voice. It was evident that the obstacle had partially yielded, but that the larynx was not in its natural condition. But as the mother was satisfied with her improvement, I did not see her again until the following April, when she was brought back, and I was pained and surprised at her situation.

“She was reduced to the greatest emaciation; respiration was very braying and painful to bear, it required the energetic contraction of all the muscles associated with the true muscles of inspira-

tion. At every breath, the trachea was drawn upwards and back so as to be buried between the sterno-hyoid muscles; the thyroid body had preserved its natural dimensions. She swallowed liquids and soup easily, but no food, like bread, which formed a considerable alimentary bolus, could pass to the stomach.

"The stethoscope again indicated that the difficulty was in the larynx, I conceived the idea of opening the upper part of the trachea and of keeping this passage free by means of a canula: I had seen the operation succeed in horses, and besides, I was induced to perform it by the danger the child ran of asphyxia, should a slight angina occur. I knew that tracheal fistulæ, after ulcers, or wounds with loss of substance, were harmless. Still, aware of the difficulties of the operation, and wishing to divide the responsibility, I called in Dr. Prevost.

"He united with me in my opinion of the dangerous situation of the child, and the necessity of relieving it, even by a hazardous operation; but advised consulting my most experienced colleagues, MM. Maunoir, Mayor, Peschier and Olivet. When called in consultation, these eminent surgeons, without partaking of my confidence in the operation, were agreed that it would be proper to try it, citing the aphorism; *In extremis morbis, extrema remedia*.

"We endeavoured to ascertain with more precision the seat of the obstruction, the glottis was explored with the finger: one of my colleagues thought he perceived a tumour, but I could trace nothing, though the examination was frequently repeated, and I persisted in the belief that it was probably the result of a thickening of the mucous membrane.

"For eight hours previous to the operation I continued examining the child attentively, and convinced myself that the dreadful progress of the marasmus was attributable to the excessive fatigue of the efforts of inspiration. They were so great, especially during sleep, that a physician, unaware of the history, would have considered the child to be dying with croup; the head was raised from the pillow at every breath and the whole body shaken.

"The operation was decided for the 3d of May; I resolved to practise it at two distinct periods, to diminish the chances of failure; in the first, to lay bare the trachea and wait for the blood to stop flowing; in the second, to cut the cricoid or some of the rings of the trachea, and not introduce the canula until the inflammation had subsided. The first stage of the operation was very difficult. The impaired respiration caused a considerable flow of venous blood, and the trachea being in constant motion, many arterial and venous ligatures were necessary. I left the wound open. Six hours afterwards, I plunged a very narrow bistoury above the cricoid, and cut directly downwards four or five lines. The air rushed out forcibly and expelled some blood. I have said, above the cricoid, for so I presume, but it was difficult to tell precisely, because of the depth of the trachea.

"So soon as this passage was opened for the air, respiration be-

came free, and we were sure of being below the obstacle, but a venous hemorrhage, at the bottom of the wound, probably from the tracheal mucous membrane, or from the network of veins immediately above this canal, obliged me to tampon, and lose the advantage of the operation for a while. The night was pretty comfortable; there was blood enough lost to avoid the occurrence of tracheitis; the child was kept in perfect rest and on strict diet. The paroxysms were frequent during the first forty-eight hours. The pulse was from 160 to 180. Perspiration profuse, but suppuration was gradually established, the compresses of charpie were removed and respiration performed through the wound.

"On the 6th, the third day, the buccal mucous membrane was covered with a slight creamy coat; pulse frequent, skin hot, no pain, (detergent gargles.)

"7th. The child frets for food: I directed very small quantities of milk and water every half hour. Three or four times a day I cleanse the sore, and clear away the pus and mucus which is constantly expelled from the trachea; otherwise they would dry on the edges and obstruct the passage of the air. At every dressing, I introduced the extremity of a laryngeal sound, to assist the opening and gradually diminish the sensibility of the mucous membrane.

"On the 12th, the ninth day, the child has regained its strength and playfulness, the expression is good, the pulse 90.—After the evening dressing, I left the opening very free, intending to return the next day and introduce a cannula. But, during the night, a great deal of mucus was expelled, which completely obliterated the opening. The persons who stayed with the child, expecting it would die suffocated, lost their presence of mind, and, towards morning, I found it covered with cold sweat, almost pulseless, unconscious, and so ill, that at first, I thought it useless to do any thing, as it seemed foolish to use restoratives to a corpse. But, reflecting that all these symptoms might be only the result of fatigue from the violent efforts at respiration, to which the child had not been accustomed for some days, I introduced a cannula. The child was still unconscious, but respiration became more rapid, 80 in a minute, and then gradually diminished; the lungs, which were probably engorged, unloaded themselves, and in two hours, the child breathed only twenty times in a minute, and began to answer by signs; the pulse was of good volume and regular. In the evening, I found her sitting up in bed and eating as well as before the crisis; from that time I considered it necessary to wear the cannula constantly, and had two made. After many attempts, I adopted the following form as best adapted to fulfil the indications:—the general form is curved, being well suited to the direction of the trachea, it could follow all its movements. The extremity is oval and furnished with three lateral openings, like a female catheter, so that it could not wound the mucous membrane, could not easily clog up and might be readily cleansed. A circular plate, at its upper extremity, assists in securing it, and prevents its penetrating too

deeply; finally, its large superior diameter, three lines and a half, gives a free passage to the air, and its small diameter, below, of two lines, prevents the sides of the trachea from becoming too much fatigued.

"Some days afterwards, the canula was left out too long, and as the nurse was unable to replace it, the child was asphyxied; I was called, and by blowing through the canula after replacing it, consciousness was soon restored; this accident taught me a lesson. After this whenever one canula was removed to clean it, the other was instantly replaced. No mishap ensued, though a severe pulmonary catarrh occurred after exposure to a draught of air, which caused an abundant secretion of mucous, and required the canula to be changed almost every hour.

"On the 22d of May, the catarrh was completely recovered from, the canula remained all night without becoming obstructed, there were no more sweats nor paroxysms. She gradually gains flesh, has a good appetite, and every thing induces the belief that there is no more danger to be apprehended; but the first indication only is fulfilled, the larynx is still obstructed: shall we succeed in attempting to relieve this? At any rate, we must await the complete re-establishment of the child's health.

"In the month of June, when perfect health was restored, I wished to make another examination of the larynx, to see what was the difficulty; but I did not find the same docility: satisfied with being able to breathe freely, and feeling assured of life, our little girl was unwilling to submit to new investigations: perhaps she acted right, under the guidance of her instinct. Indeed at this present moment, she not only enjoys perfect health, and swallows all sorts of food, without any difficulty, but, when she takes out the canula and closes the opening with her finger, her voice is found to have acquired considerable power, and the laryngeal opening is enlarged. It is very possible that the continued suppuration acted as an excretory and diminished the engorgement; besides, should we not wait for the influence of puberty? We know its effects on the organs of speech: may it not give the larynx its usual capacity? All these considerations induced me to wait patiently, without incurring new risk to my interesting little patient.

"This case clearly proves that tracheotomy may be performed, not merely to admit the air temporarily, or to extract a foreign body, but even to obtain a new mode of permanent respiration, which has not hitherto been done; at least I have not found any thing of the kind recorded.¹

"The operation was difficult, because of the tender years of the patient, and the anatomical arrangement of the parts; but in adults this would be greatly obviated, especially in men, by the prominence of the larynx, and I think the operation promises much in

¹ This passage only proves that M. Senn had not read what had been done.

cases of laryngeal phthisis, of tumours, whether within or without the larynx, on the tongue or in the pharynx, for it is known that patients often die asphyxied. It was so with the man mentioned in the first note, the operation would have afforded an opportunity of exploring the larynx, of recognising the tumour, and even of removing it."

On the 1st of August, fifteen months after the operation, Mr. Senn wrote to the editor of the Journal, as follows, begging him to publish the whole case, that the final result of the treatment might be seen :

"When I sent the essay to the Institute, six months after the operation, the child was enjoying good health; during the winter of 1828, she was attacked with whooping cough, but bore the disease well, though it proved fatal to one of her young friends. I do not know whether the larynx was dilated during the fits of cough, or whether the suppuration of the wound, which lasted three months, operated as a cautery does near an engorgement, or whether the improvement and complete change that occurred, was followed by active absorption in the diseased tissues. Perhaps all these causes acted together; however, in the spring of 1828, eleven months after the operation, when I removed the canula and closed the wound, I was agreeably surprised to find that the larynx was quite free, and even violent exercise was not followed by any difficulty of inspiration. Therefore I did not replace the instrument and in fifteen or twenty days the fistula was closed: from this time the child enjoyed good health, her voice became perfectly natural and the tone was unaltered. May we not justly hope to see patients with laryngeal phthisis relieved from impending dissolution, and after the operation carefully examine the organ, employ detergents, washes, &c., and, above all, secure absolute rest? I suggest these reflections to attentive practitioners who are desirous of advancing science. I expect to perform the operation, in a few days, on a man of thirty, who has had acute laryngitis which became chronic, and is now constantly threatened with suffocation from contraction of the laryngeal cavity. The violet hue, without any cardiac or pulmonary disease, the sensibility and volume of the larynx, and the hissing, leave no doubt respecting the seat of the disease. The patient wished first to try the effect of setons to the sides of the larynx, and will probably object to the operation until reduced to the last stage of marasmus."

The Archives Générales de Médecine, for 1836, (2d series, vol. 12, page 103 et seq.) contain two very interesting observations of syphilitic ulcerations which had brought the patients to the verge of suffocation and asphyxia. Dr. Thomas Henry Purdon practised tracheotomy in both; he adapted a canula, and the cure was complete. They are too interesting to pass unnoticed.

OBSERVATION LX.

Syphilitic ulcerations of the larynx.—Tracheotomy.—Cure.

Mary M'Alister came to the dispensary on the 3d of April, 1831, complaining of dyspnœa, and a hoarse, croupy cough. Pressure on the thyroid cartilage was painful; respiration was particularly difficult during the inspiration; the patient only spoke in a low tone; she was considerably emaciated. This state lasted six weeks, the symptoms gradually growing worse. She had syphilis several months previously, for which mercury had been pushed to ptyalism; no secondary symptoms had occurred. *Prescription*: a blister in front of the throat; hydrargyrum cum cretâ five grains, calomel a grain, opium a third of a grain, every six hours.

On the 4th, respiration was much more difficult; the imminence of suffocation rendered the operation indispensable; it was easily performed. Scarcely an ounce of blood was lost, as no vessel was opened. The trachea was divided longitudinally; a tenaculum fixed it, which enabled us to remove a small portion on each side of the incision. Then a cannula was placed in the opening, and the mercury was continued every three hours.

6th. The mouth was affected; sarsaparilla was substituted for the mercury.

The patient improved after the operation, without any unhappy accident; she was troubled for three weeks by the expectoration of thickened mucus, like that produced in the nose. At this time she had frequent desire to cough, probably determined by the cicatrisation, and the contraction of the ulceration of the glottis, in which region she had a sawing sensation. At the time of the operation, she was in the seventh month of pregnancy, and had a happy accouchement at the full term. Shortly after birth, the child had some syphilitic marks, such as a scaly eruption, and cracks in the soles of its feet. These symptoms disappeared under the use of hydrargyrum cum cretâ. She had another child in 1833. Two years afterwards she was perfectly well, breathing through the tube in the trachea; her voice is completely lost, she can scarcely articulate a word.

OBSERVATION LXI.

Chronic laryngitis.—Imminent asphyxia.—Tracheotomy.—Recovery.

Margaret Coyle entered the Belfort Hospital towards the end of September, 1835, with symptoms of laryngitis, such as low voice, cough, pain caused by swallowing, and by pressure on the thyroid cartilage; respiration hoarse. She said she had previously suffered with a similar attack, and had been relieved by salivation. A blister was ordered to the front of the neck, and blue mass night and morning. The last produced ptyalism in a week, without any

apparent improvement in the symptoms. Nothing unnatural was observed in the back of the mouth.

She was as well as usual at noon on the 1st of October, but at night the respiration suddenly became croupy. On the 2d, the face was anxious; respiration extremely difficult; the lips purple; pulse frequent and weak. Having no hope of relieving these symptoms by medicine, the operation was proposed as a last resort; the patient submitted. In this case, it was not so easily done as in the preceding, because the neck was very short, and the trachea was so very moveable, that I was obliged to fix it with a tenaculum before attempting to open it. Then an oval portion was easily removed, with a single cut of the bistoury. One little vessel only was divided, but ceased bleeding as soon as pinched. Before the trachea was opened, its motions caused air to enter the wound at every inspiration, which gave rise to a little emphysema of the cellular tissue. This was chiefly owing to the smallness of the space between the thyroid cartilage and sternum. At the moment the trachea was pierced, the lips regained their rosy hue, and the suffering was immediately relieved. From this moment, until the 20th of October, she recovered without any unfavourable symptoms, but she wore a canula, and had no voice. The mucous expectoration was less troublesome in this patient. In neither was there any tendency to inflammation of the trachea.

In both cases, the tube introduced immediately after the operation was larger than that afterwards worn; it was oval, the great diameter being rather more than one third of an inch, and the smaller about a quarter; the length was about an inch and a half. The permanent tube was small; it was long enough to penetrate a quarter of an inch into the trachea, varying according to the thickness of the parts covering this organ. It was circular and double. The inner tube, which required to be occasionally cleaned, was a quarter of an inch in diameter, the smallest size consistent with free and easy respiration. The exterior tube had no projection at the end within the trachea; this, in fact, only makes it more difficult to introduce, and does not prevent its expulsion. Indeed, three patients, on whom I have used this modification, preferred the tube without any projection. Curved tubes, according to my experience, were more readily expelled, and more difficult to clean. The larger tube used at first, has the advantage of being less obstructed by the mucus, which is then abundant. It may be cleaned without disturbing the patient. The canulas are retained in place by a riband passed through holes in the plate of silver at their outer extremity, and tied at the back of the neck.

To these important cases we might add that of Mrs. Petit, whom we tracheotomised in the last stage of asphyxia, caused by cancerous laryngeal phthisis. (See Obs. No. XVIII.)

After all, the operation is but a palliative, or temporary relief, if there exist any incurable disorder in the larynx or lungs: it may prolong life, as was the case with Mrs. Cotillard, (Obs. No. LVI,)

Mrs. Petit, (Obs. No. XVIII,) and with Mr. Fournay's patient, (Obs. No. XXII;) but when there is only ulceration or swelling in the larynx, and when the cartilages are not necrosed, there is every reason to hope for recovery, which is most happily demonstrated in the results obtained in Observations No. LI, LII, LIII, LIV, and LV.

The treatment, after the operation, is the same that would have been employed, had not suffocation required this more urgent duty. When the cure of the laryngeal lesion is slow, we should profit by the opening into the trachea, and introduce topical medications, which will be the better borne, because the larynx has ceased to convey air, and to contract convulsively on the least stimulus: thus, with a metallic probe and a piece of sponge, we have touched even the glottis with thick liquids, such as gum water, having calomel suspended in it; mercurial ointments, or any medicines which we may expect will exert a happy influence in modifying the state of the mucous membrane.

If small necroses exist, the consecutive swelling of the sub-mucous cellular membrane will not disappear until the removal of the sequestrum. We have observed such a separation in the case of Dr. Evrat, (Obs. No. LVII;) and in the case reported by Dr. Goodeve, (Obs. No. LV,) the patient threw up, with coughing, a considerable portion of cartilage.

But, if the sequestrum be of such a character that its elimination is impracticable, purulent fistulæ are established either into the pharynx or trachea, or even externally; and the small number of sympathetic disorders, sometimes excited by the laryngeal affection, allows the patients to live with a canula; who may esteem themselves fortunate, if the constant contact of a foreign body with the tracheal mucous membrane does not excite unpleasant reaction in the lungs, and, finally, tubercularisation.

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SELECTIONS

IN

PATHOLOGY AND SURGERY;

OR,

AN EXPOSITION OF THE NATURE AND TREATMENT OF
LOCAL DISEASE;

EXHIBITING

NEW PATHOLOGICAL VIEWS,

AND POINTING OUT AN

IMPORTANT PRACTICAL IMPROVEMENT.

ILLUSTRATED BY CASES.



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THE LONDON MEDICAL AND SURGICAL JOURNAL.



PHILADELPHIA:
CAREY & HART.

.....

1841.

TO THE GOVERNORS
OF THE
GENERAL INFIRMARY AT HERTFORD,
THIS WORK
IS INSCRIBED, WITH EVERY SENTIMENT
OF RESPECT, BY THEIR VERY OBEDIENT SERVANT,
THE AUTHOR.

Hertford, June 20th, 1839.



PREFACE.

The author hopes that he will not be considered as arrogating too much in claiming the character of novelty to the pathological views promulgated in the present work. If, however, it should be pointed out, by those more extensively acquainted than himself with medical literature, that similar views have been already made known, he will readily relinquish all claim to originality.

The physiological principles upon which the pathology of inflammation here set forth is based, were published eleven years ago, in a series of essays in the Medical Repository, and the London Medical and Surgical Journal, of which the author was then editor. The principles developed in those essays are founded upon a long course of experiments, repeated so frequently as to leave little doubt as to their correctness.

The object of the second part of the work is to bring into general notice a remedy whose superior curative properties, as an external application, appears to be but little known to the profession. This remedy is iodine in liquid form. Respecting the employment of iodine as an external remedial agent, the author lays no claim to originality; but, with the exception of a small volume, published some years ago, by Mr. Buchanan, he is not aware that the mode here recommended for its application has been pointed out to the public. During the last ten years the author has employed the remedy in question very extensively, both in infirmary and private practice, and the object of the present work is to acquaint the profession with the result of his experience respecting its use during that period.

Being very desirous that a knowledge of the curative properties of iodine, as an external agent, should be diffused as extensively as possible amongst the members of the profession, the author has caused the second part of the work to be published in a separate volume.



SELECTIONS, &c.

PART I.

LOCAL PATHOLOGY.

INFLAMMATION.

According to the pathology of the present day, the term "inflammation" is applied to almost every disease to which the human body is subject. The consequence of this view of the nature of disease is, that inflammation has been divided into numberless varieties, and scarcely any two authors agree respecting the manner in which the divisions ought to be made. Thus, according to some, we have the *acute* and the *sub-acute* or *chronic*: others furnish us with the *adhesive*, the *suppurative*, and the *ulcerative*: others divide the disease according to its immediate seat, or to the tissue which is affected; while others again classify it according to its tendency to spread, or to confine itself to a limited space. The dispute in every instance is, not whether the disease be *inflammation* or not, but whether it ought to be classified under one head or under another.

With regard to the proximate cause of inflammation, pathologists have been equally at variance in opinion. It has been attributed to *error loci* of certain particles of the blood; to the existence of irritating or acrid matter in some of the humours; to the viscosity of the blood itself, thereby causing *lentos* in its movement through the vessels; while most of the pathologists of the present day discard all notion of the blood having any thing to do with the causation of the disease, and seek for the origin of the malady in the solids alone. By some of them it is attributed to an *increased action* of the arteries of the inflamed part; by others to a *diminished action*; by others to an increased action of the capillaries, thereby causing them to attract more blood to the seat of disease than naturally belongs to it; whereas others again attribute all the mischief to irritation in the extremities of the nerves. In fact, the theories of inflammation are as various as the aspects which the disease presents to the senses of the observer.

Notwithstanding all the theories that have been advanced respecting the nature or proximate cause of inflammation, all must agree, that the visible and tangible signs of it depend upon the condition

of the arteries of the inflamed part, and upon the modification of the circulation of the blood within them. Taking these facts as the groundwork of the enquiry, we shall proceed to examine what this condition really consists in; we may then be able to assign some rational or probable cause for the *inflammatory* appearance put on by so many diseases, possessing in all other respects such various properties, and leading to consequences so different in their nature. First, however, as our views differ essentially respecting the *natural functions* of the vessels principally engaged in the representation of the more striking phenomena of inflammation, from those of any author with whose works we are acquainted, it is necessary to say a few words upon that subject.

A view of the Mechanism and Structure of the Blood-vessels.¹

The apparatus which conduces to carry on the circulation of the blood consists of a forcing machine, to which is attached an elastic tube, which tube divides and sub-divides into innumerable ramifications. These ramifications unite into larger branches, which branches again unite into larger and larger tubes, until, lastly, they form only two trunks which deliver the blood back to the machine from which it originally started.

We are first to notice the peculiar texture of the heart. This organ differs in respect to texture from all the other muscles. It is remarkably dense; its fibres are firmly bound together by transverse striae, and, compared with the other muscles of the body, very little cellular membrane intervenes between these fibres. This modification of structure indicates considerable strength, but with a limited scope of motion; for we find those muscles whose sphere of motion is extensive, imbedded in proportionately a large quantity of cellular tissue.

The texture of the arteries is also peculiar, but it is well adapted for the functions which they have to perform. Very erroneous notions respecting the muscularity of these vessels have been entertained by authors and by anatomists generally. In order to be able to determine this point, it is necessary to define what are meant by muscular fibres.

It must be admitted that a muscle, like all other bodies, has certain distinct characters which determine it to be what it is. It is composed of a greater or less number of elastic fibres, placed parallel to each other; and these fibres are bound together, at intervals, by striae or smaller fibres, each being separated from the rest by a very small portion of cobweb-like tissue. The primitive

¹This subject has been treated at length, in a series of essays published by the author, in the Medical Repository for 1827 and 1828, of which he was then editor. Only a short sketch of the experiments and deductions therein given can be adduced here.

or simple fibres are gathered together into fasciculi or small bundles, surrounding each of which there is a larger quantity of cellular tissue than is found around every simple fibre. The muscle is composed of a number of these fasciculi or compound fibres, and, like them, the whole body of it is invested in a coat of cellular tissue. This is the character of muscular structure.

Now, the next question is, do we find any thing in the coats of the arteries corresponding with the above definition? We presume not; that is, we presume so upon a very strict examination of their structure.

Including the external coat, which is composed of condensed cellular membrane, an artery is made up of three layers or coats. The innermost layer, which, on one side, presents a polished surface for the blood to move on, is formed of a highly elastic tissue, but nothing like muscular fibres are discoverable in it. The next layer is also considerably elastic, but less so than the innermost coat. This being the coat usually considered muscular, we have paid much attention to its structure; but upon the minutest examination, nothing could be discovered in its texture to correspond with the fibres of muscle. The mistake may have occurred from considering the fibrous processes, which unite it to the outermost coat, as muscular fibres; for, with the exception of these, scarcely any tissue in the body presents less the appearance of muscle. The outermost layer is likewise elastic, but its elasticity is inferior even to that of the middle coat, though its toughness considerably exceeds that of the latter.

An artery, thus composed of its different layers of coats, is elastic to a considerable degree; but the elasticity does not depend upon muscular fibres. Indeed, such a structure, as will be pointed out hereafter, would be inconsistent with the functions which these vessels are destined to perform in the animal economy. It may be noticed that the elasticity of the arteries is somewhat greater in the longitudinal than in the circular or transverse direction.

With regard to the veins, they have been deemed almost unworthy of notice by authors. It is true that, in a *surgical* point of view, they are less important than the arteries, but, *physiologically* considered, they are scarcely so.

Although the veins are greatly more elastic than the arteries, yet few, if any, anatomists have attributed *their* elasticity to muscular fibres. The range of calibre in this class of vessels is very considerable; and it may be remarked that their elasticity is much greater in the transverse or circular direction than in the longitudinal. This quality is different in them, in that respect, from what it is in the arteries, whose range of calibre is not, upon the whole, very extensive, compared with that of some other elastic tissues.

As this subject is of considerable importance towards a right understanding of the functions of the blood-vessels, we may be allowed to offer a few more remarks upon it.

In the human body, as well as in the bodies of all the higher classes of animals, we find that a considerable part of the structure is endued with the property of elasticity. Thus, the voluntary muscles, for the most part, are highly elastic; so are all the organs of which the alimentary tube is composed; so are, likewise, the urinary and the gall bladders; the uterus is endued with the same property in a different modification; the arteries and the veins; the lacteal tubes and the thoracic duct, as well as the ducts of the secretory glands, &c. are all possessed of an analogous property; but it differs in degree and modification in each organ, according to the duty—according to the extent of motion—which the organ has to perform. Thus, in the voluntary muscles, it enables them to shorten themselves from one third to one half their natural length; whereas, the stomach, the urinary bladder, &c. possess a scope of motion ten times as great. In the small intestines the scope is less than in the urinary bladder; the veins possess the elastic property still less than the small intestines, and the arteries less than the veins.

Now, we find here a general analogy in a number of organs, but each presents a modification peculiar to itself, and which qualifies it for its own particular function. It is characteristic of a muscle to contract in one direction only, that is, in the direction of its fibres, because its ultimate object, with the exception of the sphincters, the heart, and a few others, is not so much to undergo motion itself as to move other parts to which it is attached. On the other hand, the urinary bladder will contract almost equally in all directions. In this respect it differs essentially from muscle; for the latter will only display its elastic property in one direction. It cannot be said that the sphincters, the heart, the pharyngeal muscles, &c. are exceptions to the rule, for we find no instance of muscular motion otherwise than in the direction of the fibres of the moving muscle. Again, the motion—accordingly the elastic property—in the small intestines is both in the longitudinal and circular directions, but much greater in the former than in the latter; whereas in the colon and rectum the reverse is the case. The arteries, being situated so near the bones, and consequently being liable to great and *sudden* extension, by the movements of joints, are very yielding longitudinally; whereas, although elastic to a considerable degree in the circular direction, yet much more power is required to force their extension in the latter than in the former direction. The veins are equally elastic with the arteries longitudinally, and are fully capable of following the motions of joints without the risk of being ruptured; but as, in the due performance of their peculiar office, they are required to undergo a ready and rapid change of calibre, their elastic property in the direction of their circle exceeds that of their longitudinal direction.

Having exhibited this view of the structure of the blood-vessels, we shall next proceed to a short examination of the functions which their different parts have, each, to perform.

On the Functions of the Blood-vessels.

Any one who will take the trouble to examine the action of the heart in a living animal will be satisfied that, during its contraction, the fibres are drawn *below* the medium of their elasticity. The contraction is *active*; but the dilatation of the cavities is *passive*, depending simply upon the elasticity of the structure of the organ. If the heart be taken out and placed on the hand before its action has ceased, and then if the hand be gently closed round it, every time the ventricles contract, the organ will be felt to exert considerable force: it will be felt to swell and harden, and to cause a good deal of pressure against the hand; but, during the dilatation of its cavities, it will be felt merely to *relax* its fibres, without any active force.

The idea obtained by means of the sense of touch respecting the nature of the heart's action is fully confirmed by that of vision. When viewed in active operation, and regularly supplied with blood, its contraction will be seen to take place in a very quick and sudden manner, whereas its dilatation appears quite passive, and it takes a much longer time to be accomplished. Again, when viewed in action, *not* supplied with blood, that is, when the organ has been removed from the body, or when the blood has been allowed to escape through a puncture of one of the principal vessels, the contraction will be seen to consist in an *active jerk*, and to be over in an instant; whereas the motion which corresponds to the dilatation of the ventricles, when the viscus is regularly supplied with blood, will consist comparatively of a slow and gradual *elongation* of the fibres; which fully satisfies the mind that it depends merely upon these fibres recovering the medium of their elasticity, after having been compelled by some previous cause to contract themselves below that medium.

It may, perhaps, be asked, by what power are the muscular fibres of the heart enabled to shorten themselves below that medium which characterises them as an elastic substance? In explanation of this point we must be permitted to offer a few remarks, which may not, perhaps, be generally considered to pertain to the *practical* part of the subject, but which are essential towards acquiring a rational idea of the pathology of inflammation.

Every organ, and even every tissue, in the animal body must be viewed, physiologically, in two conditions: first, as composed of material molecules which contribute to make up the structure, and which, according to their proportions in the different organs, are endued with all the properties of matter in general, and are subject to all the laws which govern the material world: second, as parts endowed with something in addition to the common properties of tangible matter, which *something*¹ confers upon them the character

¹ This subject is discussed at great length in the essays to which reference has been already made.

of vitality. It is unnecessary, in this place, to enter into an enquiry of all the properties which distinguish animate from inanimate matter: it is sufficient for our present purpose to state generally, that those properties and those functions or effects only are to be attributed to life which an organ is capable of manifesting in a living state, and which it is not capable of exhibiting in the state of death. Thus, the liver, as a material organ, is as perfect for some time after death as before, yet blood may be forced through it in vain, so far as the secretion of bile is concerned. The dead stomach is equally insensible to the presence of food; nor will the dead kidney show any disposition to secrete urine, though fresh blood be injected into it. It is true that a muscle which has been attached to two or more points during life will contract, when liberated, even after death; but it accomplishes this effect by a property connected with its material structure, and which is equally manifested by Indian rubber and other inanimate substances endued with the quality of elasticity. The phenomenon of contraction in a living muscle is very different from that exhibited by the same muscle in an inanimate state. Nature, by her laws, has destined all things to be as they are. We may examine their properties, we may compare the properties of one substance with those of others, and observe what each substance is capable of doing, so far as our senses furnish us with the means of so doing, but if we attempt to search into the *why* and the *wherefore* they have the power of doing what they do, our curiosity will be very likely to meet with disappointment.

Now, to return from this apparent digression, we may state that the medium of elasticity of the heart is at that point where the fibres rest quiescent after death. That point corresponds to the state of expansion or extension of its cavities during life. The contraction of the organ is caused by its *vital* principle; it is a *vital* operation, acting for a very short period of time before resuming a state of repose. During the cessation of the *vital* energy, the *elastic* force of the fibres comes into play. As soon as this latter has accomplished its part, and has restored the muscular fibres to the point where resides their medium of elasticity as material substances, the vital force is repeated, and it acts again upon the muscle as pressure would upon any elastic body. This active, vital contraction, and passive, elastic dilatation or extension of the muscular tissue, go on alternately, both in the auricles and ventricles; and when the ventricle undergoes the one kind of motion the auricle undergoes the other, and *vice versâ*.

It follows from these facts, of which any one may satisfy himself by minute and accurate examination, that the *vital contractility* of the heart is a power opposed to its innate *elasticity*. The force of the former is very considerable, as may be felt by pressing the organ in the hand. Its duration is only momentary. It appears to be over as suddenly when the organ is on the point of death as when it acts in full vigour on being first exposed to view. After

death the organ rests in the state of expansion—that state into which it has been brought by its elastic property.

That the heart propels the blood into the arteries by the contraction of its ventricles, is a fact in physiology generally admitted; but it has been, and is still, a very disputed question as to whether the power of the heart be the sole cause of the motion of the fluid throughout the circulating system. We shall first enquire what share, if any, the arteries perform in the office of circulation.

Without re-describing experiments already published more than ten years ago, we may be allowed to state generally, that the coats of the arteries *do not undergo any sensible motion* during the circulation of the blood. We have repeated experiments upon experiments respecting this point, and the result was a conviction that, with the exception, in some instances, of a small portion of the root of the aorta, *the arteries are mere passive tubes* in the office of circulation. Having made this general declaration, it may be necessary to reconcile some known facts with the statement so unhesitatingly expressed.

It will, perhaps, be asked, if the arteries merely supply passive channels for the motion of the blood, how can the “pulse” be accounted for? Do we not *feel* the artery beat on placing the finger on it? Nay, do we not sometimes *see* it pulsate through the skin—that is, *see* the skin move over it? Do we not, when sitting cross legged, often see the pendent foot move simultaneously with the pulse, in consequence of the beating of the popliteal artery? These and other similar questions will be asked by those who have taken it for granted that the arteries contribute an important share in forwarding the motion of the blood. But all these facts are easily accounted for without supposing the vessels to perform any movement like that of the pulse. They occur from the following cause: the arteries are *always full* of blood. Every contraction of the left ventricle drives the column a step forward. The motion may be compared to that of a rod pushed forward from one end; but instead of being solid like a rod, the column of blood is *fluid*, and contained within an *elastic* tube. The blood being fluid, and the containing tube being soft and elastic, almost any degree of pressure, however slight, on the artery will cause a depression or indentation of its coats; and as the contractions of the heart cause the blood to be driven forward with great power, the column exerts a force, at each contraction, to raise the indentation or depressed portion of the coats of the vessel.

In like manner, in cases where the skin is seen to pulsate over an artery, the pulsation is caused by the tightness of the skin in that part, owing to the position of the limb at the time. If the vessel which, in such a case, produces the motion or pulsation of the skin, were laid bare, which would, of course, cause the removal of the pressure on its coats, not the slightest pulsation could be discovered in it. In a similar way, the pulsation of the pendent foot

when one is sitting cross-legged, is occasioned by the pressure of the knee of the corresponding limb on the popliteal artery.

If an artery be laid bare, and the finger be placed *very lightly* upon it, no pulsation will be felt; and to the sight the vessel will present an unmoving cord. Even a powerful lens will not enable us to discover any pulsation in it. Also, in some very thin persons, the principal arteries of the arm exhibit a thick cord through the skin; and, in these cases, if the finger be laid very lightly on the vessel no pulsation will be felt; but the slightest pressure on its coats will cause an indentation or depression, and will immediately communicate the sensation of pulsation to the finger.

The importance of this subject entitles it to more consideration than can be bestowed upon it according to the confined limits marked out for this work; but we may, in passing, notice, that no property usually attributed by physiologists to the coats of the arteries would enable them to render any assistance to the heart in the propulsion of the blood. Now, let us just consider two points, respecting which no small degree of error exists.

In the first place, it is maintained by some authors, that the arteries are always in a state of "forced distention," that, in fact, the blood within forces them to expand beyond their medium of elasticity. If such were the case, it is difficult to conceive in what way they could render any assistance to the heart; for not only would that organ have then to move forward the whole weight of the column of blood, but it would also be required to *force* the expansion of the arteries. What else than the power of the heart, driving the fluid into them, could force them to expand? It may be further demanded, what benefit could result from such a state of things? Nature does not often, probably never, create an useless obstruction merely for the sake of showing her capability of creating a force strong enough to overcome it.

Secondly, it is a common error to suppose, not only that the arteries pulsate independently of the heart, but also that their pulsations may be slower or quicker than those of that organ. That a subject so easily put to the proof should have been so long allowed to remain a source of error, does not argue much in favour of the industry of physiological writers. It causes some trouble to satisfy one's self upon points requiring a series of experiments on animals, but it is less pardonable to propagate error respecting a subject which any one may prove without even quitting his easy chair.

The pulse will often vary in the number of beats in a given time. One minute it may beat 85, and the next it may beat 87 or 88, or perhaps only 82 or 83. But is this any proof that it depends upon the action of the arteries? If the pulsation of the heart itself be examined, it will be found to vary quite as much as that felt in the arteries. The fact is, *that the pulse or beat is felt in every part of the arterial system at the very same instant of time, and that*

instant of time is the same as that in which the ventricles of the heart contract.

The only way in which the arteries could assist in propelling the blood forward, so as to aid the heart, would be by a series of contractions and dilatations following one another along the course of the tubes. If the vessels possessed such a power, then we might expect the pulse to vary in different parts of the body, nay, in different parts of the same tube; for while one part was in a state of contraction, another, two inches above, would be in a state of dilatation, and so on throughout the whole course of the tube. In the alimentary canal, especially the large intestines, such a motion may be observed to be continually going forward. In fact, there exists no other power for the propulsion of the *fæces*. In the arteries, however, the fact is equally certain that no such motion exists, but that an exposed artery will present to the eye the appearance of an immovable cord.

Having established these preliminary facts respecting the state of the heart and arteries during the natural and unobstructed circulation, we next come to that part of the subject upon which mainly rests our new views respecting the pathology of inflammation. We shall, therefore, place the statement before the reader under two heads:

1st. The only motion which the arteries undergo is that of *gradual* contraction, and of *gradual* dilatation, so as to adapt themselves to the quantity of blood within them;

2d. The calibre of all the arterial branches, during life, and in a healthy state, is *below* the medium of their elasticity.

The overlooking or being ignorant of these two facts have led pathologists into endless absurdities respecting the pathology of inflammation; at any rate, respecting the theory of the phenomena presented by it.

Now, during life and health *the blood-vessels are always full of blood*. Whatever artery or vein we examine it will never be found empty. It is true that the vessel is sometimes remarkably small in proportion to what it is found at other times, or to the corresponding vessel of another person; yet, still, when examined it will prove to be, according to its size, full of fluid.

For instance, the superficial veins of the arm are sometimes so small as to render it difficult to puncture them with the lancet; whereas at other times they show themselves in the form of thick blue ropes. But however small they may be they always preserve their cylindrical form; and though sometimes not so large as a crow-quill, yet if punctured they will be found full of blood. The veins on the back of the hand will occasionally present very prominent cords when the member is allowed to hang down. While in this state, if the hand be raised above the level of the heart, so as to allow the fluid to gravitate towards that organ, the veins will be found to diminish immediately in size; but the diminution will not be owing to their falling into a *flat shape*, as we see them after

death, for they will still present the cylindrical form, though the cylinders will be very small compared with their former size.

The venous system is subject to this constant change of calibre in its several parts; its power of adaptation, therefore, to the size of the column of blood within is very great. When the calibre of one part of it diminishes, that of some other part must necessarily increase in proportion, so as to make up for the diminution. These vessels are, of course, well adapted for the sudden changes which take place in them. Their structure is considerably more yielding than that of the arteries, yet it is sufficiently dense to enable them, when endowed with vitality, to preserve their cylindrical form under the ordinary pressure of the atmosphere.

Now, we find this principle considerably modified in the coats of the arteries. The object of the veins is simply to return the blood to the heart; and whether more or less of it moves through one channel than another—whether a larger or a less proportion finds its passage through the superficial, or the deep seated veins—is perfectly immaterial, so long as the right side of the heart receives its regular supply. In the arteries the case is different. Every branch of an artery conveys nourishment to some seat or other. Every twig is charged with the conveyance of all the materials requisite for the nutrition, secretion, and other functions connected with the seat which it goes to supply. This being the case, although the stoppage of the blood through a branch of an artery is not fatal to the part which it supplies, for nature has provided other means of conveying nutriment to it, still a limb would suffer great evil if changes in the calibre of its arteries were to take place so frequently and so suddenly as they do in its veins. When an artery of some size is obstructed, it is well known that some time must elapse before the limb which it supplies recovers its natural warmth and healthy condition.

It is therefore reasonable to expect that the arteries would be less liable to a sudden and rapid change of calibre than the veins. In truth such is the case. The ordinary change which the arteries undergo is the following: supposing the body to contain twenty pounds of blood: the arteries will be perfectly full—that is, every part of their inner coat will be in contact with the column of blood within: we abstract *one* pound of blood; the arteries will still be as *full* as before: we abstract *two* pounds more: yet not a portion—not a quarter of an inch—of the arterial tubes will be empty: we go on abstracting more and more; nevertheless, if we examine any part of the arterial system, we shall find the vessels perfectly full, until the animal be actually dead from loss of blood. The vessels adapt themselves to the column of blood within them; and as the diameter of that column is reduced by abstraction, the diameter of the vessel also which contains it diminishes in the same proportion.

On the other hand, as the mass of blood in the system undergoes an increase, the arteries will gradually enlarge, so as to allow it

sufficient space. They will not be in a state of forced distention, for the pressure of their contents will not be greater than if the fluid column were only half the diameter. The relation between the coats of the vessels and the blood will be the same whether the system contains forty pounds, or twenty.

This property of the arteries we have proved, beyond the power of dispute, by repeated experiments. By a series of bleedings, at short intervals, allowing just time enough between them for the circulation to recover its equilibrium, the blood-vessels may be reduced to so small a calibre as almost to render their canals imperious. This fact is so well known to butchers that their practice is entirely founded upon it in their mode of killing veal. By repeated bleedings and starvation, for two or three days, almost every drop of blood may be abstracted from the animal at the *last* bleeding, and the flesh will be left bleached. When an animal is bled to death at once, life ceases to exist before the vessels have had time to adapt themselves to their contents. The disturbance is so sudden and so great that the inherent powers of all the organs are destroyed; and, after a certain quantity of the vital fluid has escaped, death ensues, leaving still a considerable portion of blood in the system. On the contrary, when intervals are left between the bleeding, so as to enable the vessels to modify their calibre, and suit themselves to their new relations, the animal will live with a very small portion of blood in its body.

Then comes the enquiry, upon what does this remarkable property of the blood-vessels depend? Does it depend upon the innate elasticity of their coats? The answer must be in the negative; for if the animal were bled to death at once, the circumference of the arteries would be found much greater after the cessation of life than it was immediately before death, when the blood has been abstracted by repeated bleedings. We must therefore seek for the cause of the property in something not essential to the vessels as mere material tubes. In a word, this property of contractility is conferred upon them by the principle of life, which resides in their coats and which regulates their functions as vital agents.

We have already alluded to that principle in its relation to the heart, and have assigned to it the power by means of which the contraction of that organ takes place. One of its essential properties, in alliance with the elastic tissues, is *contractility*. The heart expands by the force of its elastic structure, but it contracts by the force of its vital properties.

The same properties, in a different modification, are recognised in the alimentary canal; in the urinary-bladder; thoracic duct, &c. If these several parts be examined in a living animal, the mind will become satisfied that the *vital* action or movement consists in *contraction* merely, and that the *dilatation* of the tube is caused by other agents. In the alimentary tube—take the large intestine as the best specimen—the dilatation of one portion is caused by the contraction of the portion immediately behind

forcing on the contents. A long series of such contractions and dilatations incessantly succeed each other, and, generally speaking, the dilated portions are filled principally with gas, which appears to be the agent—in addition to the excrementitious matter—employed for the purpose of expanding the tube.

The cavities of the different reservoirs are expanded by their fluid contents, in a measure opposed to both their inherent elasticity and vital contractility. For instance, if the bladder of an animal, when full of urine, be exposed, and a small puncture be made into it, as the urine escapes, the vessel contracts; which proves that not its vitality, but its *contents*, kept it in an expanded state. The tendency of its vital property is to cause it to contract; not to expand.

The arterial tunics are provided with other means of dilating their cavities. Their structure is of such a nature that, if either extended or compressed, as soon as the force which extended or compressed it is removed, it will instantly resume its former state. In other words, the coats of the vessels are endued with an elastic power which constantly tends to preserve their calibre of the same size.

But, as in the heart, that power is opposed by another, capable, in some measure, of overcoming its effects. The difference appears to be, that in the heart its action is alternate with that dependent upon the elastic structure of the organ; whereas in the arteries the contractile force is unceasingly in operation.

We now come to the most important part of this subject. A material fact, which has been overlooked by physiologists, is, that the calibre of the arterial tubes is always below that point which would obtain if the vessels were allowed to submit to their innate elastic forces. Instead of obeying the laws of dead matter, and of remaining at that state at which their elastic medium would place them, they are forced to submit to the vital force of contractility, and thereby reduce their canals to some extent below that medium.

This subject has been already discussed in another place. The present work will not permit its being fully entered into. It must suffice to state generally, that experiments have proved the fact, that if an animal be gradually bled to death the arteries will reduce their calibres more and more, until their canals become, ultimately, almost obliterated; and that, when the animal has become actually dead, and has remained so for some time—sometimes longer and sometimes shorter—the vessels will again dilate and assume that state in which consists the medium of their elasticity as dead matter, at which point they will afterwards remain.

Moreover, the circumference of some of the principal arterial branches has been measured in animals from whom no blood had been previously abstracted; the animals were then killed, and the vessels injected without any force beyond that necessary to throw in the wax. In every instance where the experiment was accurately

and satisfactorily made, the vessels measured more *after* than *before* death.

This remarkable property of the arteries increases in degree as we approach the extremities of the vessels. In the root of the aorta it appears to be quiescent during the ordinary state of the circulation. On the contrary, as we stated before, that portion of the tube is forced somewhat *beyond* its medium of elasticity at every contraction of the left ventricle. This must tend to soften the jerk caused by the sudden contraction of the heart upon the column of blood, and to modify the motion of the current.

As the blood moves onward it enters into a more capacious channel, and its velocity becomes less and less at every step, until, in the extreme branches, its motion is so slow that the jarring of the heart is not at all felt. The fluid glides on slowly and in an even stream, as may be seen with the microscope, and as is also proved when the skin is pricked.

Now, independently of direct experiments, there are several acknowledged facts which prove the blood-vessels to be more capacious after death than during life. We have already noticed the practical knowledge of butchers, that an animal may be drained of nearly all its blood by slaughtering it by repeated bleedings, instead of by one bleeding. This can only happen by the vessels closing themselves, by means of their vital contractility, upon what remains of the blood after each abstraction. After death has occurred they are again expanded by the influence of their elastic property.

When a ligature is applied to an artery the vessel beyond it will contract into a thin cord, and will become in time perfectly imperious.

Again, we are well aware that when an artery of a moderate size is cut across, and left exposed, the bleeding soon ceases, in consequence of the circular contraction of the vessel, until, at last, only a little lymph is seen to ooze out. If the contraction depended upon its elasticity it would take place immediately on the vessel being divided.

Moreover, it is a well known fact, that the vessels generally *are not half full of blood after death*. Why should that be the case? During life they are quite *full*, as has been already stated. Is it that a great part of the blood has escaped, or is it that its vessels have become enlarged, that such a difference should be found to exist in the two states? It cannot be denied that some of the serum of the blood exudes through the coats of the vessels some hours after death, but that such a quantity as would be required to fill up the vacancy observed in the arteries should escape in that manner is by no means probable.

It will, perhaps, be asked, how is the fact to be accounted for, that the arteries empty themselves at the time of death, if they exert no propelling power on the blood? The reply is, that the arteries render no assistance to the heart as far as relieving that organ of

any power which may be necessary to move the column of blood all the way round, from the left to the right side, is concerned. The organ is endued with sufficient power to do so without any aid. But when the action of the heart has ceased, there is then a small degree of power exerted by the vessels on their contents, and that force results from their vital contractility.

It must be considered that the blood moves along a channel whose area is continually increasing; and that, therefore, the obstacles to its motion are much less than if the tubes were of the same diameter throughout. Now, as death approaches, the blood first begins to meet with an obstruction in the lungs, owing to the failing of the respiratory functions. The left side of the heart, not receiving its regular supply of blood, acquires a quick but feeble action, which proceeds from little to less, until, at last, its movements entirely cease. During this time the arterial tubes are also deficiently supplied, and, according to that law which induces them to preserve their mutual relations with their contents, they gradually contract more and more as the heart's action diminishes, until their canals become almost obliterated by the time that death actually takes place. By this slow and gradual contraction, and the channel gradually increasing in area, from the root of the aorta to the utmost extent of its branches, the gentle pressure of the coats of the vessels on the blood induces it to move forward towards the capillaries. But when death has actually ensued the coats expand again, by the elasticity of their structure, and present, on examination, the appearance of large empty tubes.

To sum up this part of the subject, we may conclude; 1st. That the contraction of the heart depends upon a vital cause; but that its expansion is owing to the natural elasticity of its structure.

2d. That no motion takes place in the arteries calculated to propel the blood forward. That the heart is the sole agent which moves the blood through the arteries, and that the latter are mere passive tubes as far as the circulation is concerned.

3d. That the pulse depends solely upon the contraction of the left ventricle; that it is simultaneous in every part of the body, corresponding to the action of the heart, and that the arteries themselves possess no power of pulsating.

4th. That the only mechanical motion connected with the arteries is a gradual contraction, dependent upon their vital contractility, and a gradual dilatation, dependent upon their elasticity, so as to enable them to adapt themselves to the quantity of blood which they contain at the time.

5th. That the diameter of all the arterial branches is smaller during life than after death: that, during the former state, their contractile property retains their calibre below their medium of elasticity, but that, when the vital principle has actually forsaken their coats, they acquire that medium, by the elastic force of their structure.

On the Pathology of Inflammation.

The *elements* of inflammation, from Celsus down to the present time, have been considered to be pain, heat, redness, and swelling. That the disease is generally attended by these marks cannot be denied, but, according to the pathology of the present day, appearances called inflammation are often seen in parts after death where two, at any rate, of the elements have been unobserved during life.

We shall first consider the two last of the four essentials above mentioned, namely, the redness and swelling which are presented to the eye and feel of the observer by a seat undergoing the process of inflammation.

That the *redness* of the part is owing to the quantity of blood contained in it, cannot be doubted, and, we believe, has not been disputed; but the question is, by what pathological process does the part acquire the increased quantity? Some will answer, "by an increased action of its arteries;" while others again will maintain that the disturbance is caused by "increased action of the heart:" while some will attribute all the mischief to the "irritability of the nerves."

That the arteries do not *act* in the way generally supposed, has been already shown. They do not do so even in their principal branches; much less do they at their extremities. In the smaller vessels the blood glides on in a smooth and even stream, and presents no appearance of being pushed about by the action of the arteries; nor does it seem to suffer any of the shock by which it was first put in motion.

But supposing the arteries did act as represented: how could they, by that means, increase the quantity of blood in the inflamed part? In the first place, the arteries could dispose of no more blood than was supplied to them by the heart; and, in the second place, an increased action of the arteries of a part, far from tending to *augment* the quantity of blood in it, would necessarily tend to *diminish* that quantity. The quicker they acted the faster the fluid would be driven on to the veins, and, instead of presenting an appearance of redness, the part ought to put on a paler aspect than natural.

How an increased action of the heart can determine more blood, in proportion, to one part than to another, it is difficult to understand. The left ventricle of the heart contracts and throws out its contents into the aorta; this quantum is pushed on by another discharge from behind, and the same thing goes on in uninterrupted succession. This is all the mechanical influence which the organ exerts on the blood. Now, we frequently find one leg of a person inflamed while the other is healthy; but how can the heart direct more blood to one leg than to the other? When the organ has discharged the blood into the aorta, it has done with it. It cannot, therefore, be the agent which distributes or apportions the fluid to

the different parts of the body. If we could suppose the whole body to be in a state of inflammation, we might then, by a stretch of the imagination, suppose the increased action of the heart to be the cause of it; but the notion that the heart can produce a greater determination of blood than natural to a particular part is inconsistent with possibility.

All obscure phenomena are generally attributed to causes equally obscure—upon the principle, probably, that inasmuch as two negatives will make a positive, so ought two obscurities to make one transparency. The functions of the capillaries are but little understood: their properties, and the mode by which they perform those functions, are still less so; consequently, various effects, which could not be otherwise accounted for, have been attributed to them. They have been supposed to be the agents which relieve the arteries of their contents at the time of death, and in order to be able to perform that office they have had various imaginary properties conferred on them. By some they have been supposed to act their part by suction: others have thought attraction to be the means employed for the accomplishment of the object; but whether they act by means of the one or the other of these properties, or by any other property, it is certain that physiologists have relied greatly upon the aid of these diminutive giants for the accomplishment of phenomena for which they could not otherwise account.

As a *prima facie* proof that the arteries are not exhausted of their contents by any power of suction, or of attraction, in the capillaries, the greater part of the blood after death is found to have passed *quite through them*, into the veins. The capillaries of the skin contain scarcely any blood after death in ordinary cases, and those of other seats much less than they do during life, in proportion to the quantity in the system. If the capillaries exerted an attractive power on the blood the consequence would be, that the fluid would move towards them from both sides, that is, both from the arterial and venous sides, and the capillaries themselves would be found to form the centre of the mass. Even if their relations were with the arterial blood only, the greater part of the fluid must be found in their immediate neighbourhood if any attractive influence existed between the two. The same would be the case if they could by possibility be supposed to exert a power of suction on it. But we find the blood principally in the veins, as before stated, and in the pulmonary artery, having passed quite through the supposed seat of attraction.

A power of suction must presume a vacuum in the capillary vessels, and a degree of atmospheric pressure on the arterial tubes sufficient to compress their parietes, so as to push on the fluid within. What is there in the mechanism and structure of the capillaries calculated to enable them to cause a vacuum? While the blood is circulating, the capillary tubes are full of fluid, and, while in this state, it is evident that they can exert no power of suction on the rest of the mass. Even if we suppose them empty—which

would be supposing a thing which can hardly happen—still they must possess some innate power of expansion, so as to create a vacuum within, before any effect could be produced upon the blood in their neighbourhood. We know of no such power connected with the capillary tubes. Indeed, we know of no inherent power of expansion in any of the tissues, except that dependent upon the elasticity of their structure.

A power of suction in the capillaries must also, as stated, presume a degree of atmospheric pressure on the arterial system sufficient to compress the coats of the vessels and to diminish the diameter of their tubes.

Now, that the pressure of the atmosphere on the arteries, as well as on all other parts of the body, except the interior of the skull and of the cylindrical bones, is very considerable, no one can dispute. It is, in fact, equal to about fifteen pounds to every square inch of surface. It is also true that by relieving a part from some of that pressure—for instance, by the application of an exhausted cupping-glass—the arteries will expand very considerably, and the part immediately acquires a greater influx of blood. But it must be borne in mind that this is not the *natural* state of the part. The circumstances under which it is placed by the application of the exhausted glass are different from those under which nature intended it should exist. Under the ordinary pressure of the atmosphere the arteries will maintain a certain calibre. If the pressure be increased by any extraordinary weight—by standing up to the neck in water for instance—their diameter will necessarily diminish. If, on the other hand, the weight be reduced—as by the application of an exhausted glass—their diameter will increase.

As the arteries, therefore, are destined to bear the ordinary pressure of the atmosphere on the surface of the globe without undergoing a change of calibre; and as this pressure is *equal* on all the surface of the body, and on the internal parts, through the medium of the soft structure—on the capillary tubes as well as on the arterial branches—it is evident that it can contribute no share whatever towards forwarding the blood from the trunks towards the extremities of the arterial system.

With regard to capillary attraction being the cause of preternatural determination of blood to a part, it may be said that this cause, if it existed, ought to act at all times the same. It ought to act in one part as well as in another. What can make the capillaries of an inflamed leg more attractive than those of the other leg?

We shall not enquire at present what share the nerves may exercise in producing the phenomena of inflammation; but it must be clear to every one that they can exert no *mechanical* influence on the blood. They may, or may not, conduce to modify the vitality of the vessels, so as to induce them to put on those appearances which they exhibit in an inflamed part, but the nerves cannot, as direct agents, attract the blood from one part to another.

All these causes failing to account for the mechanical phenomena—that is, the redness and swelling—of inflammation, it becomes necessary to seek for some other causes which, so far as we are acquainted, have not yet been pointed out by authors.

Physiology is a science applicable to *living* bodies alone; no theory, therefore, which does not take into its estimate the properties of life can be founded on facts. A living body is endued with all the qualities of dead matter. It possesses form, solidity, weight, colour, extension, and all other properties which are capable of being recognised by the organs of sense. Its elements are also subject to chemical laws, like those of the rest of the material world; and by the new combinations into which they may enter, and the new relations which they may form with one another in the order of causation, either parts or the whole of the material fabric may undergo extensive changes in constitution. But living bodies possess some properties in *addition* to those common to matter in general, and these are the properties which stamp their character, and which distinguish them from dead matter.

It will be asked, perhaps, what do these properties consist in? In reply it can only be said that they are to be recognised from their phenomena or effects in union with tangible matter—or, in a physiological sense, in relation with the materials of which the body is composed—but so far as the essence or principle upon which they immediately depend is concerned, it would be extraneous to the object of this work to institute any enquiry. Those who feel curiosity respecting such speculations are referred to the essays already alluded to.

The *properties* of life manifest themselves in their alliance with particular seats or organs only. In a word, all the phenomena which an organ is proved to produce during life, and which it is *incapable* of producing after death, are fairly attributable to the vital properties connected with it. During life the liver will produce bile: after death it will not do so. Now, as we know, at any rate assume, bile to be manufactured from the blood, and as we call that species of change “secretion,” we have a right to infer that the vital properties of the liver confer the power of *secretion* on that organ. In the stomach it is the same: in the kidney, the pancreas, the salivary glands, &c., it is again the same: yet, still, it must not be forgotten that the “secretion” is *special*—that it is differently modified—in every secreting organ.

Again, life manifests itself in the nerves by the phenomenon of sensation. A dead nerve will not feel, though perfect so far as structure is concerned. In connection with nervous matter, then, the vital principle is the agent of *sensibility*, and the phenomenon resulting from the alliance of the two is sensation.

Moreover, if we examine—as we have already partly done—the properties of life in their relations with the elastic tissues, we shall find invariably that the phenomenon presented by the union of the two is contraction. This being the case, we are justified in in-

ferring that nature destined the vital properties of these tissues to be those of *contractility*. In this class of tissues may be placed the heart, the arteries, the veins, the absorbents, the alimentary canal, the urinary and gall bladders, the ducts of the secretory glands, the uterus, &c., in all of which contraction is the *vital* function, and the opposing notion, namely, dilatation, as before observed, depends either upon the innate elasticity of the structure, or upon the internal pressure of the contents of the vessel.

In the arteries, as well as in every distinct seat, the vital properties are modified of such a nature as to suit them for the peculiar office which the vessels have to perform. In the heart they manifest themselves by a *quick* and *sudden* contraction; in the arterial tubes, on the contrary, the contraction is *slow* and *gradual*, and, during perfectly healthy state, *uniform in proportion* throughout the whole arterial system. The tubes are always full: if a pound of blood be abstracted, the vessels adapt themselves closely to the remainder: when the mass of blood increases, by the sudden absorption of liquids from the alimentary canal, or by the gradual augmentation of the circulating fluid, the calibre of the tubes, on the contrary, enlarges, so as still to suit them to the increased diameter of the column. This dilatation is caused by the contractile or vital properties giving way to the innate elastic force of the tunics, in a manner analogous to that of the dilatation of the heart after the contraction of its ventricles has ceased. We may infer that the arteries are never filled up to the point constituting their *medium of elasticity*; and that such a state of plenitude *could not exist*, not only compatibly with health, but even with life.

The power of adaptation to the quantity of their contents increases in a progressive ratio as we trace the tubes from the root of the aorta towards the capillaries. In the extreme branches of the arterial system the range of change in the area in the channels is very considerable. We sometimes witness a transient blush overspread the pallid face. In such a case it is probable that the diameter of the vessels doubles itself at least. But their dilatation is often only momentary: their contractile properties soon resume their power: their calibre decreases; and the "*redness*" entirely disappears in a few minutes. In an *inflamed* part the *mechanism* is precisely the same; but the *cause* is different, and the *effect*, being according to the nature of the cause, is more permanent.

In a work intended to lead to *practical* results it would be inconsistent to enter into any the oretical speculations respecting the immediate or proximate cause of these phenomena. With regard to the phenomena themselves, and the properties of the different tissues upon which our remarks have been made, any one may satisfy himself who will take the trouble to examine the facts, and to bestow a moment's reflection upon them. It is sufficient, in this place, to state, that there exists a certain vital relation between the blood-vessels and their contents, which enables them to adapt themselves to each other, and to maintain a regular proportion between

the one and the other. Whether the vital properties be immediately and solely connected with the nervous fibrils, or with some other particular tissue, or whether they pervade all the coats of the vessels, does not come within the province of enquiry at present; for it is enough to know the fact that certain phenomena are manifested by certain tissues and certain organs in a vital state, which those tissues and organs are incapable of exhibiting in a state of death.

Now, in the case of blushing, it is often that the face alone assumes increased redness. It may be asked, how do the arterial branches of one part only of the body manage to acquire more blood than their due proportion? The heart pumps out the fluid equally for the benefit of all the branches. The power, therefore, of causing the disproportion must reside in the arteries themselves. Then comes the question—the most *important* question—by what process, or by what means, do the arteries of one seat succeed in obtaining more than their proportionate share of blood?

The answer is short and clear—*simply and solely by enlarging their diameters or calibres in that seat.*

We have already proved that the arteries are mere passive tubes so far as the movement of the blood is concerned: that they are never in a state of *forced* distension, although it is quite possible that they may sometimes contain more blood than is compatible with health: that they do not pulsate: that their calibres are always below the point constituting the medium of their elasticity as material bodies: that their only mechanical movement consists in a gradual diminution and a gradual dilatation of their canals, so as to fit them to the diminution and increase of the mass of blood: that the range of this movement extends downward from that point which forms the medium of their elasticity, to an almost obliteration of their canals: that the movement is regulated by two distinct and different causes, namely, the diminution of calibre by vital contractility—a property connected with the life of the vessels, and the augmentation of calibre by elasticity—a property dependent on the peculiar structure of the arterial coats.

When these properties of the arteries are considered, it is easy to conceive that the contractile force may vary in degree in different seats. We may again refer to the case of blushing, where a sudden mental emotion causes a temporary reduction of the contractile power, so as to allow the vessels to expand by the force of their elastic property, and admit into their canals more than their proportionate share of blood. Soon, however, the contractile force returns: the vessels resume their natural calibre; the circulation is equalised throughout the system, and the local seat loses its “redness” and recovers its natural hue.

Now, if the *cause* were different—if it were of such a nature as to weaken *permanently* the contractile power of the vessels—more especially if it totally *destroyed* that power—*then* the vessels would be *incapable* of resuming their natural diameters; an undue pro-

portion of blood would constantly exist in them; the seat of the disturbance would present the appearance of redness, and some degree of swelling, and furnish all the characters of incipient INFLAMMATION.

In a word, the visible and tangible characters of inflammation depend entirely and solely upon an undue enlargement of the capillary extremities of the arteries. The enlargement may, and often does, extend some distance towards the larger branches, but its origin is invariably in the capillary tubes, and its extension takes place by continuity along the vessels. This enlargement enables them, as a matter of course, to hold more blood than the quantity naturally or proportionally belonging to them; which circumstance is the cause of the "redness" of the inflamed part.

Owing to the increased calibre of myriads of minute vessels, and, consequently, to their containing more blood than usual, the seat of disease presents, as a matter of necessity, the character of "swelling;" which is very properly laid down as another element of inflammation. But, after a time, the swelling takes on a different character, and is dependent upon a very different cause. The capillary tubes, having lost their contractile property, and their substance having, consequently, become relaxed and their parietes become thinner, allow some of the more serous portion of the blood to ooze through, the albumen of which coagulates in the interstitial spaces of the inflamed part, and gives rise to a more durable "swelling" than that by which the disease was distinguished in its more incipient stage.

We shall not, in this place, enquire into the cause of animal heat, for it would be foreign to the intention of this work. It may be stated as a general fact, but not without exceptions, that the heat of a part bears some proportion to the quantity of blood it contains. It is possible that the heat of an inflamed part may be sometimes greater than that of the blood in the great arterial trunks; but the facts we possess are not sufficient to decide that point. It is undeniable that the temperature of the blood is, in general, higher in the trunks than in the extremities of the vessels. Now, as there is an undue accumulation of blood in an inflamed part, it is natural, according to the above fact, that there should also be an increased accumulation of "heat." Another fact may likewise be noticed, which we shall point out more particularly by-and-by, namely, that the motion of the blood is very slow in a seat undergoing the process of inflammation, so that more time is allowed for the fluid to disengage its caloric than in the ordinary course of the circulation in the same seat. There are, therefore, two physical causes to account for the augmented temperature in the seat of inflammation; which are, first, a superabundance of the fluid vehicle, charged with the distribution of heat; and, second, the diminished velocity of that fluid in the inflamed part, thereby allowing more time for the extrication of its caloric.

With regard to the influence of the *nerves* in the production of

increased heat, we deny not the fact; nor do we, on the contrary, fully acknowledge it. *If it be* a fact, it can only be stated as such; for by what means the nerves are capable of raising the temperature of a part has not yet been explained. It may be casually remarked, that the mere *sensation* of heat in a part is not always a proof of increased temperature when tested by the thermometer.

We now come to the consideration of the remaining element of inflammation, namely, "pain." What is pain? What are its relations? Has it any tangible properties? Is it a physical entity, forming a link in the chain of causation? Or is it a mental, immaterial essence, which cannot be analysed.

Nature appears to have endowed every being with a disposition to preserve its identity. *Why* she should have done so, it would not be a very profitable employment of time to enquire, for the enquiry could lead to no satisfactory result. It is sufficient to know, that from a drop of dew on the cabbage leaf, up to the "lord of the creation" himself, there reside in the being an innate disposition to self-existence, and an inherent and unceasing effort to self-preservation. The drop of dew, or a drop of quicksilver, or a piece of chalk, or a crystal of Glauber's salts, or a rose tree, or an insect, or man himself, will, one and all, resist a change of form and a dissolution of identity of the being until subjected to some cause stronger than that by means of which the identity is preserved.

Now it would be a mere useless speculation to argue the point, as to whether inanimate bodies, or even vegetables, suffer any thing *analogous* to pain in the transition from one state to another; but pain appears to be an almost—we may say, in a strict philosophical sense, absolutely—essential attendant on the change of form—that is, on the process of death—in animal bodies. It precedes the actual dissolution or the change of identity of the being, and is probably intended to warn him of the existence, or the approach, of causes inimical to him. This property, like every other recognised in the animal body, is in alliance with a certain organisation or special tissue. The pain is a nullity in the seat of the inflammation, and can only be developed in its full character by its communication with the brain.

It may be said that pain is an effect, composed of elements: that it is no pain without the combination of all its elements: that these are derived partly from the brain, and partly from the seat of disease: that the three other elements of inflammation may exist in combination without "pain," unless a direct nervous communication subsists between the seat of disease and the brain; and that, on the contrary, pain can have no existence in the absence of all derangement of some part of the body. Pain, then, is a vital effect—an effect peculiar to living bodies—resulting from the combination of causes derived partly from the seat of derangement and partly from the brain. It is an index implanted by nature to warn the individual that there is something wrong in the economy—

that causes are in operation, which, if not neutralised by other causes, may lead to a change of identity.

We must now return, in order to account for some physical phenomena, which have only been yet casually noticed, connected with inflammation.

The exciting causes of inflammation are many and various, and are very different in their nature; but the proximate cause, or, more properly speaking, the mechanical condition of the extreme vessels of the inflamed part, is the same in every case. The exciting cause may be *mechanical*, such as the prick of a pin; the laceration of the soft parts; a blow from a heavy body; an incision by a sharp instrument, &c. : or, it may be *chemical*, such as the effect of corrosive acids, or other caustic substances; the effect of intense caloric; of irritating substances, either animal or vegetable, which have the property of removing the cuticle, &c. : or it may be of that nature which, for want of a more determinate term, may be called *vital*—that is, the cause may consist in the relation or operation of agents conveyed to the part through the medium of the blood, or some other vehicle, which agents are not cognisable by our senses: in other words, our means of examination are not sufficiently perfect to enable us to obtain a precise knowledge of their nature.

But, notwithstanding the great variety of causes which may conduce to give existence to those phenomena which, according to the pathology of the present day, when combined in the same seat, are called "inflammation," *the invariable effect of all of them on the capillary vessels is to diminish the contractile power of those vessels*, so as to enable them to give way to the elastic force of their structure, and to the increased pressure of the blood within them, which increase, as we shall presently show, is a necessary consequence of their altered condition.

As this subject is of the first importance, and as we are anxious that our views should be well understood, in order, if correct, that they may be generally adopted, or in order, if erroneous, that they may be refuted, we must be permitted to enlarge a little on it here.

As the arteries are mere passive tubes in the function of circulation, the motion of the blood through them must necessarily obey the same laws as the motion of fluid in inanimate tubes similarly constructed. It is influenced by gravitation; by atmospheric pressure, to the extent already stated; by the increasing and decreasing area of the different parts of the channels along which the fluid moves; by the number and degrees of the angles which it meets in its course; by the friction caused by its contact with its conducting tubes, and by other causes which influence the motion of fluids in confined canals.

As the heart forces the blood forward, by *vis a tergo*, into the canal of the arteries, it must follow that it will find its way in equal proportions into all the arterial branches in their ordinary or natural state. The proportion must, of course, be calculated from the

diameter of the arterial trunk and all its branches. The velocity of the fluid in all the system, as well as the quantity of it moving through every branch, will maintain its due proportion as long as the tubes are in their natural and healthy state. The quantity passing through each arterial branch will be according to the size of that branch, allowing for the difference in the angles of the different vessels.

It is necessary to distinguish between *velocity* and *quantity* of motion. Velocity of motion may be the same in one drop of fluid as in a gallon, and so may the quantity; but before the two can be equal the drop must move 61440 times faster than the gallon. If we suppose the drop and the gallon to pass through equal space in equal time, their velocity will be equal; but as the gallon contains 61440 times the quantity of fluid which the drop does, the quantity of motion in the gallon will be that number of times greater than in the single drop. Quantity, in a word, is made up of the velocity and weight of the moving body; whereas velocity regards the time only which a body occupies in moving through a given space, and has no relation to the weight of that body.

Now, if fluid be forced, or be allowed to flow, through a tube varying in diameter in different parts, the *velocity* of its motion will also vary in exact proportion to the variation of the diameter of the canal in which it moves; still the *quantity* of fluid which will pass through every inch of the length of the canal in a given time will be precisely the same. Where the tube is narrower the velocity will be greater, and where the tube is larger the velocity will be less; but the diminished velocity will be made up in the increased diameter of the column of fluid in the wider parts. If we suppose such a tube to vary even fifty times in its diameter in the course of its length, any quantity of fluid moving through it, supposing it to be full, will pass in equal time through every inch of its length. In the narrower parts, the velocity will be great, but the diameter of the column will be small: in the wider parts, the velocity will be slow, but the diameter of the column will be great; so that the result will be, that precisely the same quantity will be discharged at one end as will have entered at the other.

If we suppose the diameter of the aorta to be equal to two, and that of its branches collectively to be equal to four, it will follow that, as *all* the blood injected into the former must pass through the latter, so its velocity in the former will be double that in the latter. But, as a strike off against the rapidity of movement in the aorta, the column of blood in the branches collectively will be double that in the trunk. Thus, if we add the diameter of the column in the trunk to its velocity, the product will be the *quantity* of motion: if again we add the diameter of the column in the extreme branches to the velocity with which the blood moves in them, the product will be the same in both—we shall have the same *quantity*. In a word, the velocity will bear an inverse proportion to the diameter; whereas the quantity that will move

through any given space in a given time will be the same in every part, notwithstanding the variation in the diameter of the different parts of the tube.

A necessary consequence that must follow from the above facts is, that the quantity of fluid *existing* at any time in a wider portion of the tube must be greater than that existing in a narrower portion of the same length. If we suppose an aneurism of the trunk of the aorta, for instance, it is evident that more blood is contained in the aneurismal sac than in any other portion of the vessel of equal length; but it is equally evident that not a larger quantity of blood can pass through the sac in a given time, than through a space of the same length in another part of the tube; because the amount discharged at the distal side must be just equal to that which entered at the proximal side of the aneurism.

In the same manner, as the diameter of the capillary branches collectively is very considerably greater than that of the root of the aorta, so the quantity of blood *actually existing* in every inch of their length, *collectively*, must be, even in their natural and healthy state, incalculably greater than that contained in an inch of the aorta. But in proportion as the area of the channel increases, so does the velocity of the motion decrease, until, towards the extreme ends of the tubes, the fluid glides on at a comparatively very slow rate. Owing to the elasticity of the fluid column, and to the slight yielding of the walls of the canal, the effect of the jarring action of the heart is entirely lost in the extreme branches of the system. The motion is even, and extremely slow, so as to allow time for the new relations into which the blood enters before its return by the veins.

From the foregoing facts it must follow, that, if the calibre of any one or more of the capillary branches should become enlarged from any cause, whether that enlargement be temporary or permanent, during the time of its continuance that branch or branches will contain more blood than their due proportion, according to the natural and healthy state. Another necessary consequence of the enlargement will be a diminution of velocity in the motion of the fluid through the enlarged branch or branches. This is the exact condition of the capillaries in a seat undergoing the process of inflammation. The contractile power of one or more of the extreme vessels is reduced, or sometimes destroyed, by some *cause*—the causes, as stated before, may be very various and dissimilar in their physical nature;—the vessel then obeys the elastic force of its coats, and expands: the column of blood within, immediately, as a matter of course, augments its diameter; its velocity diminishes in the inverse ratio of its increased diameter, and the part presents all the physical phenomena of inflammation.

It is clear that the exciting or morbid cause may act upon a narrower or upon a wider scale. For any thing we know to the contrary, it may sometimes consist in a mere obstruction in the extremity of one of the capillary tubes, thereby giving rise to the

commencement of the derangement; which derangement may extend to the tubes in the immediate neighbourhood of the obstructed vessel, and augment in degree as the extension increases. If such a cause ever exists its action must be mechanical, in the first instance, in its nature, like that of an external wound. It is probable that inflammation thus occasioned, in an otherwise healthy constitution, would be of a phlegmonous character; and it might extend by continuity of vessels over an extensive seat, as the disease often does when proceeding from an external wound. Or the cause may be of such a nature as to act upon a considerable number of tubes at once, and reduce, or totally destroy, according to its degree, their contractile powers. Such a cause would have its relations with the vital department of the vessels, and would modify, or entirely neutralise, the vital properties upon which their contractility depends. It may be supposed to be conveyed through the medium of the blood; and as it must be admitted that the vital properties of all the seats or tissues are differently modified, so we may easily conceive the morbid cause or principle to be capable of passing through various seats or tissues without forming any alliance with them, and yet to form a relation with another tissue to which it bears an affinity, and with which it may be brought into contact in the course of circulation. If such a cause be admitted, it may be inferred that the inflammation resulting from its operation would be of an erysipelatous character. But these speculative views may be either rejected or adopted, according to the reader's own fancy.

Whatever the nature of the cause may be, the mechanical condition of the capillaries is the same in kind in every species of inflammation. When the disease is slight, the enlargement of the vessels is not considerable, any more than the proportional quantity of blood contained in them. The velocity of its movement, also, is not much diminished. But, when the vessels have been entirely deprived of their contractile force, the enlargement proceeds to the utmost limit to which the vessels are capable of extending. The motion of the blood ceases; the fluid coagulates, and the inflamed part dies. An approach to this state of things, depending upon the same physical cause, takes place in almost every large aneurismal sac; the velocity of the blood through the enlarged space is so greatly diminished, compared with the rest of the vessel, that a part of the fluid coagulates in its cavity.

When the vessels have exceeded their natural calibre they become subject to another *mechanical* cause, whose constant tendency is to enlarge them more and more.

It is well known that, according to the laws of hydrostatics, fluid contained in vessels presses equally in all directions. The absolute pressure on the containing vessel will be in proportion to the extent of surface exposed to the fluid. The same rule holds good with regard to the arteries. The heart propels the blood into the aorta with a certain force: that force exerts a pressure on the

internal surface of the arteries according to the extent of that surface—that is, the pressure is so much to every square inch, or the square of any other measurement, according to the degree of force. In the healthy state of the arteries, the thickness and strength of their coats are proportionate to the diameter of the vessels; the pressure is therefore in equal ratio throughout their whole course. For instance, an inch in length of the aorta presents a much larger surface to the blood than an inch in length of the radial artery: so does an inch in length of the radial expose to the fluid a surface considerably larger than an inch of a capillary tube; so that, as the sum of pressure is in proportion to the extent of surface exposed to the fluid, it must follow that the force exerted on an inch in length of the aorta is very considerably greater than that exerted on the same length of tube towards the arterial extremities. But, in order to secure the safety of the vessels, the coats of the trunk and larger branches are made much thicker and stronger than those of the extreme ramifications.

It will appear clear, from the above facts, that, when the capacity of the capillaries in any seat becomes preternaturally or disproportionally enlarged, the pressure of the fluid within them will increase in the same proportion as the enlargement. The pressure is according to the square of the surface, and if, instead of presenting a surface equal to 1, the vessels in their state of preternatural enlargement or inflammation present a surface equal to 3, the force exerted on their parietes will, of course, be three times that which is natural to them. The tendency, as well as the general consequence, of this increased pressure must be, it is evident, to increase their calibre still more; and the greater the preternatural expansion, the greater will be the force tending to augment it.

We may refer again to an aneurismal sac in illustration of this principle. A small or incipient aneurism, is, comparatively, slow in its growth, because, at its commencement, its diameter is not much larger than that of the tube in which it is situated; consequently, the pressure upon its parietes does not materially exceed that on an equal length of the rest of the tube. As, however, the sac enlarges, the pressure equally increases, and the proportion which originally existed between this part of the tube and the other parts becomes less and less. Having acquired a certain size, the aneurism grows rapidly, because the force within it increases with its growth. When the sac is of a certain size, let us suppose there to be a given pressure on its internal surface; when that surface has doubled in extent, the pressure will also double in amount; so that, at this point, the sac will have twice the tendency to enlarge that it had when only half the size. The enlargement and the tendency to enlarge increase in a regular proportion.

The contractile force of the arteries must be considered as differing in degree in different individuals, in different parts of the same individual, and in the same individual at different times. In this respect it is analogous to every vital property of which we possess

any knowledge. For instance, the liver secretes more regularly in one individual than in another; and the bile is more healthy in the same individual at one period than at another. Moreover, the secretion of the liver may be normal, and that of the kidney abnormal, in the same individual at the same time. In like manner, absorption may be deficient in the peritoneal cavity, and efficient in the cavity of the pleura, of the same person. In fact, the analogy is derived from every vital function in the body.

The above fact, applied to the capillary vessels, will account for the *degree* or *intensity* of the inflammation of any seat. The cause which acts in producing the disturbance of the equilibrium may be of such a nature as merely to weaken the contractile force of the tubes in the smallest degree; or it may be such as totally to destroy that force. Between these two points there are various degrees; and, as a consequence, the inflammation may present various degrees of intensity.

Although the least degree of expansion increases the tendency to a greater expansion, by reason of the augmented pressure within the tubes, yet there exists a provision, on the other hand, in the constitution of the vessels themselves, which acts in opposing the effects of that increased pressure. It must be borne in mind that the contractile power of the tubes serves to maintain their calibre at all times *below* that which would obtain if the elastic force were allowed its full play. It is evident that the more the calibre is reduced below the point of the medium of elasticity, the greater will be the resistance offered by the elastic power of the structure. The tendency to expand in the coats of the vessels—leaving out of consideration the pressure of the blood—diminishes as the expansion advances towards the medium of elasticity; so that the resistance to the contractile force becomes less and less as the calibre enlarges. The result must be, that, if the cause of the derangement be of such a nature as only to weaken the contractile power in a small degree, though the remaining power may not be able to retain the calibre in its normal state, yet, as its opposing force—namely, the elasticity—progressively decreases as the tubes expand, the power of contractility which remains may be sufficiently strong to prevent the expansion from extending very far.

It will, perhaps, be argued against all the foregoing views, that the capillary vessels of an inflamed part are *felt* to pulsate very strongly, therefore there must be an increased action of the vessels themselves; that the large branches running towards the inflamed seat beat much stronger than natural; and that the heart itself often partakes of the disturbance.

That the pulsation felt in the inflamed part is sometimes strong, cannot be denied. For instance, in a case of whitlow of the forefinger, or of inflammation of the hand, the inflamed seat is felt to throb strongly, and the pulse in the radial artery is found much stronger than natural. But these facts are easily accounted for without attributing any pulsating action to the vessels themselves.

If the radial artery, or any one of its larger branches, were to be exposed, in such a case no motion whatever would be seen in its coats.

Now, the strength of the pulse in an artery, as a general rule, is in proportion to the size or diameter of the vessel. The brachial beats much stronger than the radial; the femoral stronger than the anterior tibial, where it passes over the instep; the common carotid stronger than the temporal, &c. In fact, whatever artery be felt, there will be found a regular proportion between the size of the vessel and the strength of the pulse; and it may be stated that all *other* peculiarities in the pulse depend upon the action of the heart. We have then observed that the diameters of the vessels in an inflamed part are considerably increased in some cases, and that there is an augmentation of their calibre in every instance. In some instances, as in inflammation of the cornea of the eye, vessels which usually do not admit the red globules of the blood become equal to small needles in diameter, and present a red, arborescent appearance. This occasionally takes place even when the inflammation is not what is termed "very high" in degree; and the phenomena attending the disease in this peculiar tissue will furnish us with some idea of the increased diameter assumed by the capillaries in seats whose texture will more readily yield to the expansion of their coats. The phenomenon of pulsation in an inflamed seat depends upon the enlargement of myriads of vessels which are too small, in the healthy state, to impart to the finger the effect of the stroke of the heart, but which, in their state of enlargement, communicate the effect of the jar, as all other arteries of a similar diameter do. In consequence of this preternatural state, or preternatural enlargement, of the capillaries, if we place the hand on the seat of inflammation, we, of course, feel a regular and sometimes strong pulsation, upon precisely the same principle as we do in a larger vessel, namely, in consequence of the impression we produce in the arterial coats by the very means we use in feeling them—that is, the pressure of the fingers.

This subject may be illustrated by facts connected with certain tumours; with what are called "erectile tissues;" with nævi; with the gravid uterus, &c. In some sarcomatous tumours the arteries are found remarkably large, and they will communicate the feel of a very strong pulsation to a finger placed on them; yet the arterial connection of the tumour with the part on which it grows is sometimes so slight that the new growth may be removed without the slightest risk of hemorrhage. The fact is, that the arteries of the healthy part in the neighbourhood of the tumour have only slightly enlarged, and the pulse, if felt in them, would be of a strength similar to that of any other artery of the same size. But these are in connection with the arteries of the tumour: the column of blood is continuous through them into the latter vessels: the vessels of the new growth are very considerably larger than those immediately connecting it with the part in which it is situ-

ated: they bear a similar relation to the latter as an aneurism does to the artery to which it is attached: in consequence of their great size, of the column of blood being continuous between them and the heart, and of the pressure of the fluid within them being in proportion to the surface exposed to it—the resistance, in other words, the “pulse,”—is felt, as a matter of course, very strong if the finger be placed on them.

In a similar manner, the vessels of a *nævus*, whether arteries or veins, are very considerably larger than those which connect them to the general vascular system. So are likewise those of the gravid uterus. The strength of the pulse in each, and all, of them will be proportionate to the diameter of the artery *at the point where it is felt*, whether the vessel be connected by a small or a large branch to the general arterial system.

The derangement which gives rise to the inflammation may be very limited in extent, as may be noticed from the prick of a needle; or very extensive, as often occurs from lacerated or punctured wounds, or in what is commonly called “spontaneous inflammation.” When the cause is slight, the extent of the derangement is generally limited, and all the phenomena are slight. It is seldom, or never, that the inflamed part can be circumscribed by a distinct line of demarcation. Generally, the enlargement of the capillaries ends imperceptibly in the normal diameter of the branches with which they are continuous. At other times, the augmented calibre extends to some of the principal arterial branches leading to the inflamed part. When this occurs, the pulse felt in these branches will be, of necessity, stronger than natural, because the column of blood presses on a larger surface. For instance, in a severe inflammation of the hand or fingers, the radial artery will partake of the disturbance: it will lose a part of its contractile power: its calibre will sensibly enlarge: the diameter of the column of blood within it will consequently increase; and, instead of imparting the sensation of a radial pulse, the amount of pressure on the finger will be such as to produce a pulse equal to that of the brachial artery in its ordinary state.

It may be noticed that the sensation of throbbing which the person himself, who is the subject of the inflammation, feels in the inflamed part, is owing to the tightness of the integuments, and to the density of the tissues surrounding the enlarged vessels. This tightness or density causes a compression of the parietes of the vessels, upon the same principle as the finger does in feeling the pulse; and the coats react and impart the impulse to the nerves of sensation distributed in the integuments. In internal inflammations, such as pleuritis, peritonitis, &c., there is a total absence of the sensation of throbbing; because, however the enlarged vessels may be compressed by the surrounding tissues, yet, as the nerves of the inflamed seat are not those destined for the office of sensation, and as the pulsation is not powerful enough to be communicated to the surface, through the medium of the parietes of the chest or abdomen,

like that of an aneurism, for instance, no sense of throbbing is perceptible to the sufferer. The only feeling is that of *pain*, which, as already observed, is a property attendant on almost all vital derangements in the animal system.

That the action of the heart is often disturbed in cases of local inflammation, affords no reason to conclude that the inflammation depends upon the disturbance of the heart. That would be mistaking the effect for the cause. The action of the heart is disturbed in hysteria, in hydrophobia, in epilepsy, in chorea, and in a variety of other maladies wherein none of the phenomena of inflammation are observable, but no one ever thought of attributing those affections to any derangement of the heart. The fact appears to be, that, in inflammation, there exists a certain vital derangement—a reduction of the vital powers—a modification of some of the vital properties—and the necessary consequence is *pain*: pain is a property related with the nervous system: the centre of this system, in the higher animals, is in the brain: from the brain some of the effects of the pain are transmitted to the heart, probably through the medium of the same system, and the consequence is a derangement of its natural function. In fewer and more common terms, the derangement of the action of the heart is caused by the inflammation; not the inflammation by the derangement of the action of the heart.

If the views we have taken respecting the properties of the arteries are founded on facts, it might be considered sufficient to state them simply, without any further explanation; but as, possibly, some may be disposed to dispute them, without taking the trouble of examining the facts upon which they rest, we may be permitted to say a few words upon the advantages derived from the nature of those properties, and to show that they are the best adapted for the functions which the arteries are destined to perform in the animal economy.

That the coats of the arteries are endued with an elastic property, no one will dispute. We are told, very justly, in all probability, as a general principle, "that nature does nothing in vain." What, then, is the object of the elastic quality in the coats of the arteries? It will, perhaps, be answered, "to press the blood forward along the tubes." But, before it can do so, it is clear that the vessels must be first *forced out* beyond the medium of their elasticity, and that they can only react on the blood by their resilient force, or their effort to resume that medium. Now, let us ask, by what power can they be forced out? There is no power with which we are acquainted that can act upon them, calculated to force their expansion, except that of the heart. But, as it is a law of nature that the resistance should be equal to the force applied, the power of the heart would be totally wasted, or spent to no purpose, if it went to force the vessels beyond the medium of their elasticity, in order that, by their resilience or reaction, these vessels might, in their turn, press the blood forward; because the same quantity of

power which would be expended by the heart in dilating the arteries would suffice to move the column of blood a distance equal to that to which the re-action of the vessels would move it. In such a state of things, there would be one force set up to oppose another, without any object or advantage to be gained.

On the other hand, the reason why the ordinary and natural calibre of the arteries should range *below* the medium of their elasticity is quite clear, when once pointed out.

It will not, we presume, be disputed that the mass of blood in the body varies very considerably in quantity at different times. Some persons swallow two or three quarts of liquid within a short period, most of which remains for a time in the vessels, before the kidneys can act in throwing it off. In cases of cholera, we have injected *above two gallons* of water, containing carbonate of soda in solution, into the veins of persons at one time, yet nothing like over distension seemed to take place.¹ Some practitioners are in the habit of abstracting two or three pounds of blood at once in cases of inflammation, or of inflammatory fever, and a much larger quantity is frequently taken away by repeated bleedings within a short period of time. Now, if the contraction of the arteries depended upon their *elastic* quality, and their dilatation upon the force of the heart forcing the blood against their parietes, it is difficult to conceive how they could adapt themselves to the great

¹ In the first patient in whose case this practice was adopted, we were, together with Dr. Furnivall of this town, who assisted us, rather surprised at the large capacity of the vascular system. He was a bargeman, naturally strong and healthy, but, before the operation, reduced, in a very few hours, to the very last stage of cholera. A vein in the arm was opened, and syringe-ful after syringe-ful injected, until nearly two gallons of fluid were thrown in before the skin appeared to change its aspect. Gradually, however, the interstices began to fill; the shriveled appearance of the skin began to relax; the blue colour gave way to a more natural hue, the man, who had been some time quite insensible, and in a state almost doubtful whether he was alive or not, opened his eyes, and became gradually able to answer questions put to him; the pulse became perceptible at the wrist, and the change was altogether most extraordinary. Considerably more than two gallons of fluid were injected, yet the surface of the body was hardly restored to its natural fulness. In this case there came on, shortly, attacks of an epileptic nature, which were repeated at intervals of some minutes until he died; which occurrence took place some hours afterwards. In five other cases, in which the injection was practised, the temporary good effects were equally striking; but not one of the patients permanently recovered. The practice was only adopted in the very last stage of the worst cases. They were all roused for a time, and none but the first suffered any cerebral affection from the injection, although equally large quantities of fluid were thrown in. The effects in all these cases were the following: as soon as, or immediately after, a sufficient quantity of fluid to rouse the patient was injected, either a vomiting came on, or the bowels acted, so that, in a few minutes, a quantity about equal to that injected was discharged from the body. A repetition of the experiment was invariably followed by the same train of effects; namely, first, a temporary rousing; then an enormous discharge from the bowels, leaving the patient each time in a state similar to that in which he was before the injection.

variation in the quantity of the fluid contained in them. If the quantity were great the force required on the part of the heart to dilate the vessels must be enormous, for it is in the nature of an elastic body to increase its resistance the more it is stretched beyond the medium of its elasticity. On the other hand, if the fluid were reduced in quantity, so as not to be sufficient to fill the vessels up to the medium of their elasticity, there would necessarily be a vacuum in some part or parts of their canals. If such were to happen, it is evident that a fatal disturbance must take place in the circulation. The column of blood would be broken, and the heart would not receive a regular supply of fluid to act upon.

But, regulated in their calibre by a vital property, which always retains their diameter below the medium of their elasticity, but which, owing to the vital relation subsisting between them and the blood, yields gradually to an increase in the quantity of their contents, the arteries are fully capable of adapting themselves to any variation which may take place in the circulating mass, so as, under all ordinary circumstances, to embrace the column of fluid in such a way as to leave no vacant space within the vessels. It may be said that the maximum of blood in the system, compatible with health, or perhaps with life, would fill up the vessels to that point which constitutes the medium of their elasticity. What the minimum may be is uncertain, but that the tubes are capable of diminishing their calibre to a very small comparative size, we have had abundance of proof.

As a guard against any inordinate pressure on the interior of the arteries, from over distention, the veins are so capacious, and so capable of accommodating themselves readily to the amount of their contents, that the mass of blood might temporarily receive great increase without causing very material inconvenience. The quantity of blood in the veins must depend upon that transmitted to them by the arteries. In a word, the arteries possess a complete command over the veins, and the calibre of the latter will be determined, as a general rule, by the supply which they receive from the former.

But it is, on the other hand, quite evident that a disturbance of the equilibrium between the two systems of vessels could not last long without causing serious injury. If we suppose the veins to contain more than their due proportion at any time, as one end of the column continually discharges itself into the right side of the heart, and thence into the lungs, these organs would soon become over-loaded if the left side were not equally ready and capable of passing it off into the arteries. In the natural state of the circulation the equilibrium is soon restored by the mutual correspondence of the action of the two sides, after having been disturbed by sudden exertion of the body, or any other cause. The circle must be at all times a continuous column: in other words, every artery and vein is *full* of fluid throughout the circle; but their diameters will depend entirely upon the quantity of blood in the system.

From the facts which have been stated in this section, we are justified in concluding:

1. That the calibre of all the arterial branches, in the normal state, bears a uniform proportion throughout the system.

2. That the proportion is governed by a vital property residing in the coats of the vessels, and bearing a relation to the blood within them.

3. That any reduction in the amount of the vital power of the vessels will allow their calibre to be enlarged by the force of their elasticity.

4. That the immediate consequence of a preternatural enlargement of the vessels is an increased influx of blood into them.

5. That the visible phenomena of inflammation result from a number of the capillary branches of the arteries having lost a part, or the whole, of their contractile power, thereby having become enlarged in their calibre, so as to admit, and retain, an undue proportion of blood.

6. That, while the capillaries are in the state last mentioned, the velocity of blood within them undergoes a decrease, although the quantity of fluid existing in them has acquired an increase; which increase imparts to the seat of disease the character of redness.

7. That the strength of the pulsation of an artery—in other words, of the “pulse”—bears some ratio to the size of the vessel at the point where it is felt. Thus, if a branch whose diameter in one part is equal to 2, expands a short distance further on into a diameter equal to 4, the “pulse” felt at the latter part of the branch will be much stronger than that felt at the former, where the tube is smaller, although the latter is nearer the heart, which is the source of the pulsation.

8. That the throbbing felt in an inflamed part depends upon an increase of size which the capillaries have acquired in consequence of a reduction, or loss, of their contractile power; thereby presenting a larger internal surface to the force of the heart through the medium of the column of blood; and,

9. That the preternatural expansion may extend to a principal arterial branch leading to the seat of the inflammation, and, by consequence, may give rise to an increase of strength in the pulse in that branch compared with its normal state.

Cause of Difference in the Character of Inflammation.

What are the physical causes which serve to give inflammation the great varieties of character observed in different cases? In some cases it presents the appearance of hardly any thing more than a mere blush, attended with a slight pain, and a trifling increase of heat in the part, and its duration is almost the only thing which distinguishes it from a blush. In others, the characters of the disease are more striking; the redness shows a deeper body; the pain is more intense; there is a degree of fulness or swelling

of the part, and its temperature is augmented ; yet, in a few hours, or a few days, it may resume its natural state by means of the *vis medicatrix* of nature alone. Sometimes the disease spreads over a great extent of skin, without causing much disturbance among the deeper seated tissues ; whereas, at other times, the subcutaneous cellular membrane of nearly a whole limb may be destroyed by it, where the integuments themselves suffer comparatively little. In some instances, the vessels of the inflamed part assume a new function, and give rise to the formation of pus in one place, and in another throw out a mixture of lymph and fibrine, whilst in a third the fluid product is mere serum. In one case the disease eats up the part by piecemeal, or by small ulcerations, whereas, in other cases, it destroys the vitality of a whole limb at once. In fact, the varieties of character presented by "inflammation," according to the general application of the term, are very numerous.

The two principal divisions of inflammation made by authors has been into phlegmon and erysipelas. The former has been defined as being less disposed to spread than the latter ; more plethoric in its character ; less dangerous in its tendency, though more *active* in its nature ; the inflamed part opposing greater resistance to the pressure of the finger, and presenting more fulness and swelling, with a deeper intensity of redness. Erysipelas, on the other hand, has been considered more insidious in its character, sometimes spreading to a great extent without affording any clear proof of the magnitude of the mischief going forward ; to show, according to the common expression, less "action" in the inflamed seat, yet to have a greater tendency to destroy its vitality ; to oppose less resistance to pressure, and to be altogether more diffuse in its character than phlegmonous inflammation.

Now, that inflammation presents these extreme differences in different instances is well known to every practitioner ; but it is also equally certain that there are cases, even more numerous, occurring, which belong to the one class as much as to the other. In order to reconcile these, which, in truth, form the great majority, authors have termed the doubtful cases "phlegmonous erysipelas," thus thinking, we suppose, that they must be right if they applied a term embracing both divisions of the disease.

The principal divisions have been again subdivided in various ways. We have the "acute" and "chronic," which are the oldest terms we possess respecting the subdivision of the disease ; but the term "chronic" has been of late years changed for the term "sub-acute." So far as we can perceive, one is as applicable as the other ; but neither will convey any precise or distinct idea of either the nature or degree of the malady. How long must the inflammation last before the term "chronic" will apply to it ? Again, where is the line to be drawn between the "acute" and "sub-acute ?" How are the degrees to be measured ? What is the scale to consist of ? *Intensity* of symptoms ? Who is to judge of the comparative intensity ? If we were to estimate the degree or intensity of the

disease by the heat, redness, and swelling observed in the part—which are the only outward signs of inflammation—we should often find all these much less in a limb on the point of running into a state of gangrene than in many cases where the tendency is considerably less serious. In some instances we find considerable redness, and some degree of swelling, without any perceptible increase of temperature, and unattended with any sensible pain. This state of the vessels is called congestion by some authors, and chronic inflammation by others.

From the great difference of opinion among pathologists, respecting the mode of classifying the varieties which inflammation presents in different cases, there is reason to suppose that various diseases are arbitrarily included in that term, which bear but slight, if any, resemblance to each other in their nature. That the same disease may differ in degree in different cases, is reasonable to suppose; but that the same disease should present itself sometimes in the form of a small pimple, as in the measles, and other exanthematous affections; at other times in a circumscribed tumour of a determinate extent, as in a common boil; in other instances in a diffused form, of unlimited extent, &c., and should lead to such a variety of terminations, is not probable; and we doubt the benefit that can arise, in a practical point of view, from viewing it in that light.

There are three things to be considered as determining the nature of a disease, and it is probable that these will embrace all the varieties which diseases can present under any circumstances. These are—

1st. The nature or properties of the cause which conduces to create the vital derangement;

2d. The tissue or immediate seat upon which the cause exerts its influence; and

3d. The general constitution of the patient, or the constitution of the tissue upon which the cause primarily acts.

In a work like the present, it is unnecessary to discuss these points at length, for the treatment of a disease is determined upon, in general, from the more prominent signs which characterise it. In order to point out, and to render clear, our notions respecting the immediate operation of various causes in the production of disease, more space would be occupied than can here be applied to the subject.

But it may be noticed shortly, that it should not be forgotten that disease is a state or condition of a part possessing vital properties; and that, in analysing its character, these properties should never be left out of the estimate. The properties of life might be discussed *physiologically* in the abstract, as distinct entities from those of the material fabric; but, in a *practical* point of view, it is convenient to consider them as parts of the constitution of the tissues with which they are connected. In looking upon them in this light, our enquiry should be directed to two points; first, what is

the amount of all that a tissue *can do*: in other words, what is the sum total of its functions? Second, in what way can that tissue *suffer*—what character does it put on under the influence of a morbid cause? In proceeding in an enquiry like this, the legitimate mode consists in not attributing any effects to vital properties which can be proved to depend upon mechanical causes; and, on the other hand, to assign to the vital department of the tissues those effects which, from their nature, cannot owe their existence to causes of a mechanical kind. For instance, the motion of the blood in the vessels has, among other causes, been attributed to an innate mobile power existing in the fluid itself. It is true that the globules of the blood, examined through a powerful microscope, are seen to move among themselves, even out of the vessels, for a short period, while the blood remains fluid; but this fact affords no proof that they are capable of progressive motion along the tubes of the vessels. Facts equally convincing, and even more so, prove that the blood is *not* capable of moving along the vessels by its own inherent impulse, for when the power of the heart is removed from it, its progressive motion immediately ceases.

On the other hand, it is evident, according to the extent of our present knowledge, that the secretion of bile, of gastric juice, &c., cannot be the effect of a mechanical cause, for we know of no analogous products emanating from any combination of mechanical powers. And although chemistry enables us to discover the material elements of which these secretions are composed when out of the body, yet no power of chemistry is capable of compounding fluids suited for the offices which these have to discharge in the animal economy.

Now, it is one property of every tissue endowed with life to preserve its own identity. In the course of the operations going on in the body every tissue maintains its own distinct character, notwithstanding the constant removal and renewal of the material molecules of which its structure is composed. The mucous membranes do not assume either the character or the functions of the serous membranes; nor do either of these transfer themselves into cellular tissue; nor into muscular fibres; nor into gland, &c. Each preserves itself, feeds itself, renovates itself; thus maintaining a marked character, which distinguishes it from all other tissues. As we know of no mechanical or chemical process in nature analogous to this, we are justified in attributing it to vital causes. Hence, each tissue, during life, is endowed with an innate power of preserving its own identity, by the agency of its vital properties.

The next thing which each tissue is capable of doing, is to perform the function for which it is destined. It will, perhaps, be said, that we know nothing of the nature of the powers by means of which it is capable of accomplishing such an object. It may be replied, that we are equally ignorant of the power which brings a stone to the earth; which binds together the particles of which the stone is composed; which determines one crystal to be different

from another, &c. We only know that certain properties are connected with the elementary constitution of bodies, which prompt or compel those bodies to do what they do; and that, when the same properties are in combination, the same effects will always follow. In this respect, our knowledge will apply with equal correctness to the functions of living parts. What we find these parts do, we know them capable of doing. In the normal state, each organ performs a distinct function, and observation has proved what that function is. Observation also proves that certain causes conduce, while operating, in modifying that function. As, therefore, facts prove these points respecting the nature and properties of the organs, it follows that, as every tissue which enters into the composition of each organ forms an essential part of its constitution, each tissue of which the structure of the organ is made up must possess properties peculiar to itself—properties differing in modification from those of all other tissues.

As mere conduits for the blood, the properties of the capillary vessels in all the organs, and all the tissues, are similar. The vessels are equally capable of adapting themselves to their contents in one seat as in another. Their elastic quality will expand them, and their contractile power will reduce their capacity, in the liver as well as in the stomach; in a serous, as well as in a mucous, membrane; in a gland as well as in a muscle: but it must be considered that *contractility* is only *one* vital property connected with them.

By examining this subject according to the principles already laid down, namely, that if the effect be different the cause must also be different, we are led to conclude that the modification of the vital properties of the capillaries is different in every seat—in every tissue of which an organ is composed. This conclusion is founded upon the facts, first, that the physical characters of all the tissues are different; and, second, that the nature of their functions is different. We may instance the liver and the kidneys in illustration of this point. Although *secretion* is the function of each, yet the product of the function is different, notwithstanding it is derived from the same mass of blood in both.

As all the structure, in the first step of vitality, and all the secretions resulting from the structure in a vital state, in the second step, are derived from the same common mass of blood, and as both are dependent upon some property connected with the extremities of the arteries, it must follow that if this property were the same in *all* the extremities, the structure must be the same in every part, and, as a consequence, there could be only *one* function. This proposition is as self-evident as that *two* and *three* will make *five*. The necessary inference, therefore, is, that the discerning, and in the secretory organs the secreting, extremities of the arteries—whatever their form or nature may otherwise be—differ in their vital properties in every tissue, so as to be suited for the particular office which they have to perform in each seat. In this respect

they are analogous to all the works of nature; and it would be as fruitless to enquire why they should be so, as to enquire why a heavy body should gravitate towards the earth. It must suffice to know that if the effect be different, the cause of that effect must be also different.

According to the foregoing view, the extreme vascular branches are different in their modification in every tissue, so as to suit them for their particular functions; although, in all parts, they possess the property of contractility, which enables them to adapt their calibre to their contents. As this is the case, it will follow, as a consequence, that even the same cause acting upon them in different tissues, may—nay, *must*, in some respects—give rise to different modifications of phenomena. One common consequence may follow in all, namely, dilatation of their canals, and, consequently, the admission of an undue share of blood, attended by the other characteristics of *inflammation*; but that inflammation must differ in its modification in every tissue, according to the peculiar properties of the vessels in each. As the various shades of difference in these properties cannot be defined, because the effects resulting from them are so minute, in some instances, as to escape our observation, we must found our illustrations upon tissues somewhat in the gross.

Now, as a general principle, we find the tendency of inflammation of the serous membranes to be the secretion of a sero-fibrinous fluid, and the formation of adhesions between their opposite surfaces. This is the case in the common or diffused variety of the disease. It is true, that, in some peculiar inflammations of those membranes, granular ulcerations and the secretion of pus are found to have taken place; but any one may satisfy himself that, in such cases, it is not the general serous tissue that has suffered as a principal, but certain points either enveloped within its texture, or situated immediately behind it. These points evidently differ in their physical characters from the membranous tissue itself; but as, like all other tissues, however small in size, they must owe their existence to vessels and to the blood, their arteries must be specially modified in their properties, and must, therefore, bear special relations or affinities to any causes which may act upon them. By continuity, or by immediate contiguity, the disturbance may, and always does more or less, extend to the vessels of the general tissue, which, consequently, is made to partake of the disease, and to give exit to its own peculiar morbid fluid, which becomes mixed with the more purulent matter emanating from the original seat of the disease. In almost all cases of this description, the leading characters of the inflammation are stamped by the properties of the tissue originally affected.

As an analogous principle, we find that the tendency of the mucous membranes, in a state of inflammation, is to secrete *pus*, and that this modification of tissue is not endued with that adhesive property which forms a distinguishing part of the character of the

serous membranes. Inflammation of the mucous tissues, also, has a much stronger tendency to cause softening and ulceration than that of any other tissues. Like the serous membranes, the mucous are liable to suffer in an extensive degree; in other words, their inflammation has a tendency to spread over a great part of their surface. Like the serous membranes, also, when traces of inflammation are found in circumscribed spots, it will be discovered, on close examination, that the origin of the disease was not in the membrane itself, but in certain points or glands either enveloped in its substance, or situated immediately in contact with it.

In the cellular membrane, again, we find the inflammation *sui generis*. When limited in extent, its tendency is to form a circumscribed abscess, if it does not terminate in what is commonly called "resolution." On the contrary, when the cause acts upon a wider scale, death ensues in the tissue, and extensive sloughings take place, if the vital powers of the general system be sufficiently strong to bear the effects of the constitutional disturbance. The tendency of the disease is similar in all the parenchymatous structures. The consequence, in its first degree, is a resumption of their normal state by the vessels—a restoration, by virtue of the *vis medicatrix*—of the innate principle of self-preservation implanted in the constitution of all bodies—of their contractile power. In its second degree, its tendency is to limit itself, by forming a circumscribed abscess. By this means the vessels are enabled to ease themselves of a part of their undue burthen. In the last degree, the consequence is the death of the tissue affected. Owing to the entire destruction of the contractile power of the capillary vessels, the blood, whose motion has decreased in velocity in proportion to the expansion of the tubes containing it, comes to a complete stagnation, and the discerning function—the function by means of which the structure is perpetuated—ceases. The result, of course, is the death of the part.

These peculiarities of inflammation in the different tissues are general in the animal body. Where they differ, the difference is only in modification, for the general character of the malady is the same. The same analogy is discoverable in all the tissues. When the skin is the seat of the inflammation, the disease puts on a very diffusive character, which has its peculiarity, like that of other seats. Here, it is commonly called erysipelas. As the vessels of the skin must be modified differently from those of all the other tissues, according to the principle already stated, it is natural that they should exhibit their sufferings, under the influence of a morbid cause, in a manner different from all others.

From the foregoing observations, then, it must, we should conceive, be admitted that the nature of the tissue affected has a considerable share in determining the character of the inflammation. In fact, we may say that the tissue constitutes the basis which is to form the distinguishing points in its character, because inflamma-

tion of the same tissue always presents phenomena very similar in their nature, though differing in degree and modification.

In the next place, it may be enquired how far the character of the inflammation is determined by the nature of the cause which produces it?

The fact cannot be refuted, that the same tissue presents, in general, similar characters while in a state of inflammation—that, as already observed, the serous membranes furnish a fluid peculiar to themselves, and show a great disposition to unite their surfaces—that the mucous membranes secrete pus, and are not disposed to form adhesions—that the cellular membranes, and the parenchymatous tissues, readily run on to sloughing, if the disease be so extensive as to preclude the formation of a limited abscess—that, in the true skin, the disease is diffuse in its character; peculiar in its sensations, owing to its immediate connection with the nerves of touch; dangerous in its tendency, owing, probably, to the same cause producing disturbance of the cerebral functions; that its secretions are serous or lymphatic, which appear in the form of blisters, similar to those secreted by the same tissue under the action of vesicatories. The same analogy applies to the glandular tissues. It is true that the liver, the kidneys, the *mammæ*, the testes, the pancreas, &c., each present diseases, in different cases, very unlike in their characters; but it must be remembered that every secreting, as well as other organ, is made up of various tissues, and that it may often happen that the real or original seat of the disease is not that tissue which gives its peculiar distinction to the organ, but a subsidiary tissue, such as the cellular, which pervades all the other tissues. That this inference is not altogether hypothetical, is proved by the fact that each of these organs, as well, indeed, as every organ in the body, does present disease of a character peculiar to itself. That peculiar carcinoma which takes place in the *mammæ* never exhibits itself in any other tissue as an original disease. The kidney is subject to a peculiar granular affection, the like to which is not found in any other part of the body. The liver exhibits morbid appearances different from what is ever discovered in any other seat. It is the same with the pancreas, testes, lymphatic glands, the thyroid gland, &c. How far additional and more minute examinations may hereafter enable us to find out the special seat of the various eruptive diseases, it is impossible to tell, but as they, in every instance, present distinct and peculiar characters, it is legitimately to be inferred that they are allied with some special points or tissue distinct from the rest of the general structure.

But, although each tissue sets forth its diseases in a way peculiar to itself, and although the diseases of each agree at all times in the most prominent points of their character, yet the same tissue presents great modifications in the character of its affections in different cases. The facts already stated are sufficient to prove the basis upon which the character of various inflammations is founded, but

there must be some other powers which determine the modifications of the disease. The question, then, is, what are those powers?

Now, an *effect* is sometimes made up of *many* causes: it must always consist of *more* than *one* cause. It has been already shown that one reason of the varieties put on by inflammation is the nature of the tissue affected. This cause is inherent in the constitution of each tissue, and plays its part in mankind generally, as well as in every individual case of inflammation. This cause forms the groundwork of the character. The next is the *exciting cause*. We mean by "exciting cause" not those *mediate* causes, such as cold and moisture, but that cause, whether mechanical, chemical, or vital, which acts immediately upon the living tissues. The enquiry, therefore, is, what facts are we in possession of to determine the manner in which such a cause acts?

It is a fact, in the first place, that any violence inflicted upon the vessels of a part, is a sufficient cause of inflammation of that part. Whether the violence be a blow, a laceration, a puncture, a cut, or whatever its nature may be, a *vital disturbance* is the result.

Why living parts should be subject to any disturbance from violence, it would be just as profitable to enquire as why sulphuric acid should consume a piece of marble. By the next step we arrive at a point where we can trace causation better:—vital disturbance of a part is very soon followed by a dilatation of its capillary vessels, thereby inducing them to admit larger columns of blood: this is the first visible character of the inflammation. Now, the link in the chain of causation which binds the vital disturbance with the enlargement of the capillary tubes, appears to be this: any disturbance or derangement of the vital powers must tend to *weaken* those powers: the *natural* tendency and object of the vital powers, in the capillary vessels, is to regulate their contractility, and determine their calibres according to the nature and function of the tissue which they supply: the necessary consequence, therefore, of such disturbance or derangement must be dilatation of the tubes of the capillaries. Let us see in what respect this view could be disputed.

It will, perhaps, be maintained, that any disturbance of the vital powers must tend to increase, rather than diminish, their amount, and that, therefore, if their object be the contractility of the vessels, as represented, the calibre of the tubes ought to become *less* by the effect of violence applied to them—in other words, that derangement in any living part must add to the vital powers of that part, instead of taking away from those powers.

In reply, it may be said that such a view of the vital powers would be contrary to every analogy. It would be assuming, contrary to known fact, that the effect of disease is to render the body stronger than it was in a state of health; or, in an analogous manner, that the more drops of sulphuric acid you let fall into a solution of carbonate of soda, the more carbonate of soda you will find in the solution.

If, as is reasonable to suppose, the object of the vital powers be the preservation of life; and as the first step towards the destruction of life is the disturbance or derangement of health, or of the *natural* condition of the living parts, it would be an inconsistency to infer that such a derangement can add to the *strength* or *power* of those parts. It may be said that health, in its most perfect state, consists in the highest power of vitality which the body can attain, and that any deviation from that state must be the effect of a diminution, and not of an increase, of the powers upon which the phenomena of life depend. Health, then, being the natural condition of a living part, must consist in, or be the result of, its most perfect vitality; and disease, on the contrary, being also a state or condition of living tissue alone, must depend upon some abstraction, or neutralisation, of the vital properties of the part. In whatever point of view we examine the subject, we cannot infer a disturbance, or derangement, of the vital properties of the vessels of a part to impart any addition to the powers of life in them. In consonance with these views, let us analyse the effects of mechanical violence on the vital properties of the capillary vessels.

There is no known reason why a blow, a puncture, or a cut should not act in a similar manner on the capillaries of all the tissues. Certain derangement takes place as a consequence; but as the cause is of a general, and not of a specific nature, it must be supposed to produce the *same kind* of derangement in all the vessels within the sphere of its influence, in proportion to the degree of force acting upon them: at any rate, we are acquainted with no reason why the effect should be otherwise.

But if such be the case, how are we to account for a degree of violence, in one instance, producing death, whereas, in another, no such effect follows, although the degree of violence, according to every proof, has been much greater? In one case, the effect may be erysipelas; in another, the formation of an abscess; in a third, extensive sloughing of the cellular tissue; in a fourth, gangrene of all the tissues of the part on which the violence has been exerted. In other cases, again, we find a mixture of these effects—we find erysipelas, abscesses, sloughing, and partial gangrene, all combined in the same limb. Now, the cause of this must be sought for in the constitution of the tissues themselves. As the mechanical violence is the same in all, we must look for the difference in the effect in the conditions of the parts which have suffered the injury; for it would be inconsistent with our knowledge of the operations of nature to suppose that the effect does not owe itself to some physical cause. This cause will be found in the difference of modification in the vitality of the part. For instance, the capillaries of one tissue may be in a state nearly, if not quite, healthy, while those of another, in its immediate neighbourhood, may swerve one or more degrees from that state. It is reasonable to suppose that the same degree of violence inflicted upon the two, in such different conditions, would produce different degrees of derangement of their

functions; and it, in fact, requires only this difference to stamp the character of the inflammation. The disease will put on characters according to whether one or more of the tissues suffer, and according to the degrees in which they respectively bear a part. The inflammation is, in general, a compound effect, proceeding from derangement of various tissues, and exhibiting, therefore, a mixed character; but it will also be considerably modified according to the grades of suffering of the different tissues.

It was the opinion of John Hunter, that the character of inflammation could not be determined by the tissue affected, otherwise we ought to expect various kinds of inflammation to take place in an amputated limb, because the knife cuts through all the tissues alike. The same reason has been often repeated since, by authors in support of the same opinion. Let us examine its force.

First, has it been *proved* that the same stump does not present different kinds of inflammation? On the contrary is it not a *fact* that different varieties of the disease are observed in the same stump? In a great number of amputations, the degree of vital disturbance is so small that not sufficient inflammation follows the operation to impart a decided character to the disease; but in those cases where, either from the violence of the injury which gave occasion for the operation, or from the peculiar modification of the constitution of the patient, inflammation is fully established, it cannot be denied that the disease frequently, nay, generally, does exhibit the mixed character resulting from the peculiarity of the affections of each tissue. So far as the skin is concerned, its vital derangement presents those distinguishing marks which characterise erysipelas. Its colour is of a bright crimson hue, like that of erysipelas; its redness disappears on pressure, as in erysipelas; and it has a tendency to vesicate, as it has in genuine erysipelas. In this respect, therefore, the inflammation, as it affects the skin, is of the erysipelatous kind from its commencement in a mere crimson blush, even to its highest degree, marked by vesication and death of the part. The subcutaneous or cellular tissue, also, puts on the character peculiar to itself while labouring under disease. If the inflammation be moderate, yet a degree above that which favours the exudation of the glutinous lymph, through the medium of which nature carries on the process of union, the cellular tissue gives exit to purulent matter, similar to that contained in the cavities of abscesses. In a higher degree of inflammation, the tissue shows its usual disposition to slough. As this tissue surrounds all the muscular fibres, inflammation of the muscles themselves will necessarily be modified by that of the cellular membrane which pervades, as well as envelopes, them. Indeed, we know but little more of inflammation of the muscular tissue than that the vessels of the muscles become fuller than in the healthy state, and that, in the highest degree of the disease, the blood stagnates in these vessels, and the tissue dies.

It follows, therefore, so far as our observations extend, that the

facts connected with inflammation proceeding from the amputation of a limb, are in favour of the view that the character of inflammation is determined by the tissue affected; for we find the disease differently modified in every tissue; and the modification observed in each tissue is similar to that resulting from the vital derangement of the same tissue under all ordinary circumstances.

In the second place, even if the characters of the inflammation, in alliance with the different seats, were not so uniform as they really are, other causes might tend to modify them, and render them unlike in different cases. As we stated before, one tissue may be in a healthier or more natural condition than another, and the several tissues may vary materially in their condition with respect to the natural and healthy standard. This variation may owe itself to some original defect of constitution, as scrofula, or other hereditary causes; or it may have been brought about by causes acting during life, by their relations or affinities with particular seats. In cases of this nature, it is reasonable to infer that a tissue whose condition is furthest from the healthy state, would suffer most under the influence of the same cause. In other terms, the same cause, acting upon several tissues, varying in the amount of their natural vital powers, would affect those most whose powers are least—whose powers are lowest or most distant from the natural or healthy standard.

From the foregoing observations, it would appear that inflammation arising from external violence will be first, in a degree proportionate to the amount of that violence; second, that it will be characterised according to the tissue or tissues upon which the violence has been inflicted; and, third, according to the conditions, with regard to the amount of vital powers, of those tissues at the period of receiving the violence. Thus, a slight blow may cause inflammation so intense as to end in gangrene in a short time. We only know these conditions, or modifications of vital powers, from their effects; but that they are dependent upon some peculiarity of the living tissues, is reasonable to infer, because the same mechanical cause—the violence—does not produce the same effect in all cases.

In the next place, we enter upon a consideration of causes whose nature is more hidden from our observation than that of causes connected with mechanical violence, namely, internal causes, or those whose relations with the vital tissues are of a more obscure character than the simple operation of external violence. The object of enquiry is the extent of our knowledge, or experience, respecting the influence of such causes in determining the character of inflammation.

Now, there exist certain facts connected with inflammation, which show that the varieties it presents are not accidental, but that they are determined by some physical causes which act similarly on all constitutions. Nothing can prove this point more satisfactorily than the circumstances attending *specific* inflammation, although differing in degree and modification in almost every case,

yet the general aspect of each species is so much alike in all, that the mind cannot reject the conviction that there exists a similarity of causes for the same disease in each individual. Whether we view the venereal inflammation, the scrofulous, the gouty, the variolous, or whatever other species of the specific kind, the prominent characters of each, in different persons, are so nearly alike, that the rational inference to be drawn from the phenomena is, that a similar cause, though differently modified in some respects, acts upon the same tissue in every case, though the tissue also may be modified differently in each. The condition of the tissues, as before observed, may either depend upon their original formation—upon an innate defect of vital energy in them—or upon a change having taken place during life, by the gradual operation of physical causes.

In illustration of the same properties in the animal body, we may notice the effects of different medicines. Medicine like the morbidic poisons acts as a physical cause upon the vital structure. It is well known—indeed, this knowledge forms the very foundation of our practice—that almost every medicine acts specially upon some seat. That many substances exert, besides, some general action on the various parts is very probable; but we have sufficient proof that each bears a special relation to some seat more particularly than to any of the others. For instance, mercury exerts its influence more especially on the salivary glands; ipecacuanha on the nerves of the stomach; sulphate of magnesia on the mucous surface of the small intestines: opium on the brain, &c. In fact, there exists scarcely a medicine of any activity which is not well known to exert some special influence upon some particular organ or tissue: so that, in nineteen instances out of twenty, its effect in that respect may be depended upon. The same effect is produced whether the medicine be introduced into the body by the stomach, by injection into a vein, or by absorption from the surface: which proves that it is not the result of mechanical action or of local irritation simply, but that there exists a necessary relation or affinity between the properties of the medicine and those of the seat or tissue whose functions it modifies.

As medicines exert their influence upon some particular seats or tissues in preference to others, and as this effect is found to take place almost uniformly, even when they are administered to individuals differing in general habits and constitutions, it cannot but be inferred that the same tissues, in all individuals, possess a great similarity of properties, and that they are liable to be affected by the same causes.

Our knowledge respecting the manner in which medicines act on the different tissues, is not of that positive kind which will justify us in laying down practical rules; but we may be justified in inferring that other substances introduced into the system, though not coming under the denomination of medicines, will also act upon some seats or tissues rather than upon others. With the exception,

perhaps, of those substances which exert their influence directly on the nervous system, we know of no way in which medicines can act on the various parts but by being first conveyed to those parts in the common course of circulation. It will, probably, be said, that cathartics are also exceptions to this rule—that their action depends upon the irritation they are supposed to cause on the nervous membrane of the intestines. In support of such a supposition there is no proof. Indeed the proof exists on the other side, namely, that the ingredients first enter the circulating tubes, and are conveyed through the medium of the blood to the parts upon which they exert their influence, because, when injected into the veins, or are made to be absorbed from the surface of the body, they still act upon the same special seats as when applied directly to those seats.

It cannot be denied that the body is liable to imbibe various materials, from the external world, that bear injurious relations to it. Besides the stomach, into which matter in almost all possible modifications is received, at various times, the lungs, and the whole surface of the body, present a sufficiently extensive area for the admission into the system of morbid causes. The history of malarious diseases in all countries, and the facts which present themselves daily to our observation respecting the small-pox, and other exanthematous disorders, furnish abundant proof of the aptitude of the animal body to admit substances whose physical operations are injurious to its well-being.

Now, in every specific disease we find the same seat affected in almost all individuals labouring under it. Syphilis affects the tonsils first; then the skin; then the periosteum of the tibiae. It might be asked, why does it attack these bones more than others? The only answer we can give is, that these bones, or their periosteum, are differently modified from all the others, and that, consequently, their relations are different. If the periosteum of the tibiae is modified according to its own kind, the vessels by which it is manufactured, nourished, and preserved must be also modified differently from those of the periosteum of the other bones, and must therefore, have their peculiar relations or affinities modified. Facts of this kind are not to be rejected because we cannot tell *why* they should be as they are, for we are equally ignorant of the "*why*" an acid should have the power of changing the properties of an alkali.

Again, variola, and other cutaneous diseases, intermittent and remittent fevers, &c., present the same leading characters in all cases. It is true that they differ materially in degree; but they affect the same parts and exhibit similar symptoms, in every case. In truth, were it not for this uniformity of character, we should have no means of knowing them to be what they are. It is the resemblance of the most prominent signs of a disease in all constitutions that enables us to distinguish one disease from another, and that forms the foundation of all classifications. Truly, in most of our nosological classifications, diseases are classed together which

have very few properties in common ; but that is not the fault of nature but of art : nature is uniform in *her* operations, however changeable art may be.

In well known and long observed specific diseases, whether general or local, their identity is exhibited in all constitutions. However various the modifications may be, still their prominent characters cannot well be mistaken. But affections of a more irregular occurrence, and the causes of which are not so general in operation throughout nature, do not present themselves to our notice in the same definite and striking manner as those termed specific, or even as those arising from epidemic or endemic causes. In one instance we find "spontaneous" inflammation take place in the foot ; another time in the leg ; another time in the knee ; in another case a whitlow occurs ; in another a diffused inflammation of the integuments of the face and head ; in another an abscess of the liver ; a carcinomatous tumour of the breast ; the development of pulmonary tubercles, &c. These, and numerous other affections not owing their production usually to causes acting upon a general scale have been considered more obscure in their origin ; and they have not been traced up to their sources, like those dependent upon specific, or epidemic, causes.

But the question is, do these, or do they not, owe their existence to physical causes, as regular in their operations, when applied to the body, as those which give origin to syphilis, variola, intermittent fever, or any well known malady ? Are they the effects of real physical laws, or do they break out "spontaneously" in the strict sense of the term ?

We can form no idea of a change taking place in any part of the body without its being brought about by something possessing a substantive existence. If a part is originally perfect, it must continue perfect, unless changed by the intervention of something which bears an unhealthy or abnormal relation to it. Let us suppose all the tissues entering into the composition of the kidney to be in a real state of perfection—that is, to be in a state of absolute health, or possessing the highest degree of vitality of which they are capable : we can form no idea of the organ changing from this condition so long as the same causes which kept it therein continue to operate. It could no more start *spontaneously* from a healthy to a morbid state, than a piece of chalk could transfer itself spontaneously into plaster of Paris. In both cases there must be the interposition of some new ingredient, which, by playing its part as a cause, serves to modify the properties before connected with the body. In the case of the piece of chalk, there must be the interposition of sulphuric acid, which destroys, or considerably modifies, all the properties which the chalk possessed, and gives existence to others possessing new characters. In the kidney, the change must be analogous from the really healthy to a morbid state. Some physical cause must interpose its properties, and thereby modify those of the organic

tissues, so as to reduce the quantum of their vitality below the degree which marked it before.

The same principle will apply to every tissue in the body. When its condition is changed, the change must owe its existence to the intervention of a new cause.

As the blood is the common pabulum for the supply of all the tissues, it is very probable that it is also the vehicle which conveys substances deleterious to those tissues; and that the relations of substances, so conveyed, are formed in the different seats, in the manner found to take place in specific diseases. They may pass through the capillaries of various seats without disturbing their functions, or producing any derangement of their vital properties; but when arrived at a seat with the properties of which they bear such a modification of affinity as to excite a disturbance of their vital arrangement, the vessels of that seat—being the labourers by means of which the material fabric is kept in repair—lose a portion of their vitality: in other words the vital properties are changed; their contractility is diminished; their calibre is increased, by virtue of their innate elastic power; the velocity of the blood through them becomes less, although the quantity existing in them is greater, than natural; all the phenomena of inflammation take place differing in degree according to the scale of vital derangement, and in modification according to the tissue affected, and its condition in relation to the healthy standard at the time of the action of the cause.

From the view we have taken of the morbid cause of inflammation, there exists no necessity for assigning any mechanical obstruction to the capillary tubes. M. Magendie in the last of his very interesting lectures,¹ appears to attribute the origin of common inflammation to obstruction, as many pathologists did before. It cannot be doubted that the microscopical appearances of a part commencing to inflame, are such as might be expected to show themselves from obstruction in the capillary tubes. The motion of the blood, at a certain point, diminishes so much as to give the appearance of its being obstructed in its passage. The vessels, at the same time, increase in fulness and redness; and these appearances extend rapidly to the neighbouring tubes, as if the fluid were driven in torrents to the collateral channels in consequence of obstruction to its natural course.

But a moment's consideration must satisfy us, that a mere mechanical obstruction in a capillary tube cannot occasion the phenomena just described. We do not find such an effect follow the tying of a larger branch, where complete obstruction is produced. The blood directs its course, or its course is directed, to the collateral branches, without occasioning any disturbance in these branches resembling inflammation. The collateral tubes very soon adapt their calibre to the additional quantity of blood sent into them,

¹ Published in the *Lancet*.

and no functional disorder takes place. Now, if an obstruction of a considerable arterial branch may be produced with so little disturbance to the circulation, and if the subsidiary branches so readily adapt themselves to the additional duty imposed upon them, of giving transit to an increased quantity of blood, it would be almost an absurdity to suppose that the mere *obstruction* of a single capillary tube could give rise to phenomena like those of inflammation, where myriads of collateral tubes surround it on all sides. It is probable that fifty anastomosing ramuscles would join within the fiftieth part of an inch of any part in a capillary tube where the molecular obstruction might be supposed to occur; and amongst so many channels of conveyance in the immediate neighbourhood, any obstruction of a single tube, or of fifty tubes, would create little disturbance to the circulation.

The only manner in which an obstruction can be supposed to cause inflammation is, not by acting mechanically in blocking up the passage of a capillary tube, but by the deleterious relation subsisting between the obstructing object and the coats of the vessel, thereby giving rise to a disturbance, or in more common terms, producing *irritation*, of those coats; the necessary consequence of which irritation or vital disturbance is the abnormal dilatation of the obstructed vessel, followed by the other phenomena of inflammation. Whether inflammation ever originates from such a cause, can be a mere matter of surmise. If the affirmative opinion be adopted, we must also adopt the doctrine of *error loci*; for it is evident that the moving molecule could not become impacted unless it entered a tube too small to permit it to pass through. However, the being obliged to admit such an opinion is no reason for rejecting a fact, provided the fact itself has been proved.

The microscopic phenomena observable in a point commencing to undergo the process of inflammation, are so like those which might be expected to arise from obstruction, that it is not to be wondered at that they should have been mistaken for those of obstruction, by pathologists who entertain the common notions of inflammation. The first sudden application of a stimulus, whether to the web of a frog's foot, or to the capillaries of any part of the human body, causes, perhaps in all instances, for a moment, an unnatural *contraction* of the vessels; but this momentary contraction is succeeded by a preternatural dilatation, and by a diminished velocity of the blood within the tubes. Whether the momentary increase of the contractile force be an effort to resist the influence of the deleterious cause, by inducing the vessels to draw their parts together into the smallest compass, and to condense their properties into the most compact state, may be a matter of dispute, but it is indisputable that the vital powers are soon subdued, and that the preternatural contractile efforts are immediately obliged to succumb to the influence of the morbid cause.

As soon as the vessels begin to relax, after the application of a stimulus, whether that stimulus be the prick of a needle, or some-

thing else applied to the vital part, the motion of the blood immediately diminishes, and the fluid appears to the sight as if something obstructed it in the tubes. As the vessels continue to enlarge, the velocity becomes less; and as the enlargement extends by continuity to the neighbouring capillaries, the part puts on an appearance as if the blood rushed into the collateral branches owing to an impediment to its course in one of the canals. It is evident that all this appearance cannot take place from the stoppage of one tube among a million—that such an accumulation of blood, and such intense redness, cannot owe their existence to such an insignificant impediment in the middle of so wide a channel. On the other hand, an appearance like that described must be the natural consequence of an inordinate expansion of the capillaries extending from a single point.

Admitting the facts adduced in the present section we may be permitted to conclude,

1. That the most prominent characters of inflammation are dependent upon the tissue affected.

2. That every variety of inflammation—in other words, that inflammation of each tissue—is modified considerably according to the nature of the cause producing it.

3. That every variety of the disease is also modified according to the condition of the tissue affected.

4. That every variety is likewise modified according to the general condition of the system; which, of course, embraces the condition of each tissue.

5. That the same cause may produce more than one variety of the disease, by acting upon more than one tissue.

6. That the nature and properties of each tissue are determined by its nutrient vessels.

7. That the vital properties of the nutrient vessels are differently modified in each tissue, so as to suit them for the special purposes of the tissue.

8. That, therefore, the vessels of all the tissues are liable to be affected somewhat differently, and in a different degree, by the same cause.

Condition of the Blood in Inflammation.

In the lectures to which an allusion has been made, M. Magendie seems to attribute inflammation in general to the condition of the blood alone. His views are founded upon experiments of whose correctness we entertain no doubt; but the conclusions which he draws from them are remarkably worthy of doubt in a practical point of view.

The facts are, that defibrinised blood or blood whose fibrine is deficient in proportion to its other ingredients, is liable to, and generally does exude through the coats of its vessels in different seats, and gives to these seats, when examined after death, the appearances

of being in a state of inflammation. Also, that some of the tissues of an animal whose blood has been defibrinised are subject to redness and ulceration.

Now, with regard to the redness observable, on *post mortem* examination, in animals whose blood has been defibrinised, it cannot, if dependent on transudation of the blood, as we believe it is, bear any analogy to inflammation. The redness is, probably, the only element of inflammation existing. As the morbid appearance depends upon a cause similar to that which gives rise to the ecchymosed spots of scurvy, of petechiæ or the livid spots which often take place in those who have been long confined in jails, there is reason to infer that the exudation is unattended both by *heat* and by *pain*. With regard to the *swelling*, it can amount to no more than what depends on the quantity of fluid extravasated, for the blood is deficient in that very ingredient to which the permanent swelling of inflammation is owing, namely, fibrine.

But it will be said that ulceration takes place, and that ulceration cannot occur without inflammation. If it be insisted on that the ulcerative process can in no instance go on without being preceded and accompanied by inflammation, then it must be admitted that the morbid appearances observable in animals whose blood has been deprived of the greater part of its fibrine, are those consequent on inflammation. But it would be almost as reasonable to insist upon every function in the body to depend upon an inflammatory operation, as to insist upon ulceration being so in every instance. In instances of emaciation from want of food, there is a removal of structure upon a large scale, but no one will attribute it to an inflammatory process. There is an instance recorded where the stomach consumed a portion of itself after death. It is presumed that it will not be insisted on, that the process here adopted by the self-consuming organ was that of inflammation. The ulceration which characterises a chancre is often unattended by the least appearance of inflammation. If these facts be admitted, it is possible to account for the ulceration of some of the tissues in animals whose blood has been defibrinised.

When the blood has been defibrinised, it must, of course, be in an abnormal state. This alone would render it unfit for the numerous transformations which it is intended to undergo in the various structures. But, deprived of its fibrine, it has lost that very quality by means of which, principally, the structure of the body is renovated after the removal of the old materials. Absorption goes on, but the renovating elements are wanting, so that the discerning function is at a stand still. The absorbing process, no doubt, exceeds the discerning in all parts of the body, so that there is a universal course of *emaciation* going on in the system: but the privation does not show itself in the form of *ulceration*, except in parts void of epidermis. From the softness and sponginess of the mucous membranes, they are the most likely to be the first to put

on the appearance of ulceration in consequence of the excess of absorption over the renovating process.

We have observed frequently before, that nature has implanted an innate disposition to self-preservation in all bodies. As the blood is the common pabulum from which all the structure derives its renovating elements, and, consequently, upon which the maintenance of the whole fabric depends, it is probable that, in cases of accident, or where artificial means have been used to deprive it of an essential property, the vital efforts of the whole system would be directed towards restoring to it that property. Why does nature shoot out roots from a willow branch stuck in the ground? Why does she restore the head of a snail? the arm of a newt? why heal a wound? restore a piece of nerve? unite a fractured bone? The *why* of these things we are not able, and never *shall* be able, to find out, although we may discover the processes employed for bringing about the effects. The blood being one of the most essential agents for the preservation of the animal, the absorbent functions, in cases of defibrination of the fluid, may assume an action sufficient to take up a part of the fibrine already laid down in the form of structure, in order to restore its lost quantity to the common pabulum.

But that the condition of the blood exerts an influence on inflammation, is highly probable. Indeed, we are not acquainted with any mode in which the morbid cause of the disease can find its way to the different seats except through the medium of that fluid. Whether the original application of the poison be to the stomach, to the lungs, or to the surface of the body, the vehicle by which it is conducted to the various seats must be the blood. As this is the case, it must follow that this fluid is liable to deterioration of properties, like the solid structure; for every thing which is calculated to reduce it to an abnormal state must be injurious to it as a vital agent.

It is a question well worthy of consideration—but one which can only be satisfactorily decided by experiments founded upon a more correct knowledge of the chemical and vital properties of the blood than at present possessed—how long the morbid cause of disease may exist in the mass of blood before exerting its affinities and exhibiting its effects on the solid parts? As a second part of the enquiry, it would be desirable to determine how long, if any time, after having acted in a way to produce morbid symptoms, the morbid cause continues to exert its influence on the seat of disease?

That the morbid cause continues, in some instances, to circulate for a considerable period in the mass of blood, before imparting its deleterious influence to the solid structure, is probable, from some facts connected with the origin of certain diseases. For instance, in intermittent and remittent fevers, the noxious vapours are frequently in connection with the body for a considerable period before the disease developes itself. Some constitutions suffer sooner, and some later, proving that those who suffer last were exposed to the

morbific cause from the first, equally with those in whom it produced a sooner development of the malady. From this circumstance, it is not improbable that a certain quantity, or a certain density, of the cause is necessary before the vital properties of the structure can be made to submit to its influence. As those properties differ in their degree of vigour in different constitutions, as numberless facts go to prove, one person may so far resist the operation of the cause, as not to present actual symptoms of disease, twice or three times as long as another, though, doubtless, some portion of the power of the system has been abstracted by its influence before the actual breaking out of the malady, or before disease manifests itself by symptoms.

If the blood can become loaded with morbid poison, and remain so for some time previous to the development of disease, it is reasonable to suppose that it may continue to retain the same noxious cause after its effects have shown themselves in connection with the solid structure. During the continuance of the exposure to the same deleterious influence, the body must go on receiving new portions of the same poison, and, of course, the blood cannot purify itself of it while the external circumstances continue unchanged.

It will perhaps be asked, if such be the case, how is it that the system ever rids itself of the noxious influence while remaining in the same locality? As it is a *fact* that it does so—that intermittents and remittents get well of their own accord, in localities and at periods where and when others are falling under the influence of the malaria—it must follow that the system is endued with some inherent power of relieving itself from the effects of the poison. It is evident that the restoration of the vital power is not dependent upon the removal of the cause which first produced the disease, because the same cause still continues in operation, as proved by its action upon others; but it is equally evident that the morbid relations of that cause with the vital parts have changed, otherwise the effect must still continue the same as at first. It follows, therefore, that the change which has rendered the operation of the poison innoxious, must have occurred in the system itself.

The only mode in which the living parts can be supposed to have acquired a new power of resistance, is by modifying their properties in such a way as to render themselves proof against the affinities of the morbid agent. A power analogous to this seems to be inherent equally in animals and vegetables, by means of which they are able to neutralise themselves under external circumstances foreign to their original habits and conditions.

But that the cause, which originally gave rise to the disease, frequently continues to exercise its influence upon the body long after the development of the malady, is proved by the recurrence of the paroxysms of intermittent and remittent fevers. The former of these will often keep on long after the removal of the subject of it from a repetition of the influence of the original cause—that is, the action of the poison.

Now, the principle which applies to the operation of a general morbid cause, will apply equally to that whose sphere of action is more limited. It probably seldom happens, in cases of local disease, except where mechanical or chemical violence has been applied to a part, that inflammation is set up by one application of the cause—a single dose of poison—to the tissues whose vital properties are disturbed.

We have already endeavoured to prove that such a thing as "spontaneous disease" can have no existence, and that diseases whose causes are not capable of being visibly shown are still the effects of causes not less physical in their nature. We have also shown it probable that the blood is the common vehicle of morbid poisons, as well as of nutrition. These points being admitted, it may also be readily supposed, considering the circumstances attending the operation of endemic causes, that the blood may long continue to hold in suspension, or in union, a quantity of the same morbid elements which gave rise to a local disturbance, after the first development of the inflammation. If this be the case, we may account for the obstinacy in some cases, and the rapid progress in others, of the inflammatory process; because the seat of disease receives an incessant supply of the same elements which first produced the vital disturbance. We may illustrate this point by the circumstances attending hospital erysipelas, and, indeed, erysipelas in general, as well as peritoneal inflammation, especially of the puerperal kind. It is probable that most of the eruptive inflammations are supported in an analogous manner, until their term of existence has become extinct, from exhaustion of the poison which gave rise to them, or from its emission from the system.

In inflammation of any extent, the blood, when taken by venesection, puts on a well known appearance, called the "buff-coat." This appearance is considerably modified by the manner in which the blood is abstracted; by the shape of the vessel into which it is received; by the quantity drawn into it, and by various other causes. Although the firmness of the coagulum, and the thickness of the buff-coat, differ in degree according to the above causes; and although the blood sometimes does not show any of these appearances in inflammations of some magnitude, yet they are so generally attendant on it, that it is not easy to dissociate the idea of a necessary connection between them.

The buff-coat is nothing more than a layer of fibrine, but why, or owing to what physical properties, it separates itself from the other ingredients of the blood in cases of inflammation, in cases of pregnancy, &c., it is not so easy to determine. Merely to state the fact, that the coagulation forms more slowly in these cases than during the normal state, so as to allow more time for the red globules to subside before they are entangled in the meshes of the fibrine, will not account for the physical cause of the difference in the quality of the fluid; for it may be demanded, *why* does the blood coagulate less quickly in inflammation than when taken from

a healthy body? But, in truth, it may be much doubted, until further observations on the properties of the blood be made, whether, as a general rule, the process of coagulation be slower in cases of inflammation, than those where that disease does not exist. That it sometimes proceeds very rapidly, is a fact well established by observation.

To discuss this subject so fully as it merits, as a general question, would occupy more space than can be here allotted to it; but it may be suggested as probable, that the firmness of the coagulum in these cases bears some ratio to the reduction of the vital properties of the blood, either by the influence of the morbid cause of the disease, or by the abstraction of the red globules by venesection.

Where the disposition to form the buff-coat exists, if any number of portions of the same blood be drawn at the same time into different vessels of the same shape and size, the consistence of the cake will, in general, be found to vary in them all. The quantity of serum expressed, and the density of the coagulum, will be least in the portion drawn first, and both will increase in the order in which the different portions were abstracted. But this will only hold good as a general rule, for the visible qualities of the blood sometimes change so suddenly as to render it difficult to assign any physical cause for the alterations. Blood abstracted during the cold stage of an attack of inflammatory fever will often not present the slightest appearance of buffiness, whereas another portion drawn an hour afterwards will be as buffy as any inflammatory blood. On the contrary, inflammatory blood will sometimes cease to be buffy after the first or second bleeding, though by far more commonly this quality increases in proportion to the quantity abstracted.

It may be also noticed, as a general rule, that the thinner and more emaciated the patient is, the denser, and generally the quicker, the coagulation will be. In such constitutions, the blood presents the appearance of buff in the most trifling cases of inflammation; whereas in strong, robust, especially fat, individuals, the fluid often exhibits hardly any buffiness, even in severe cases. The buff, as by far the more general rule, bears an inverse ratio to the vital powers of the system.

It may be asked, why should the blood exhibit the buffy quality in cases of pregnancy? There is here no inflammation—no abnormal condition of the system—for pregnancy is as much a natural process as the digestion of the food or the contraction of the heart. But, during pregnancy, there is a new and additional draft upon the constitution set up. The vital powers of the mother are obliged to be divided between herself and her child. There is an abstraction of the natural quantum of blood from her, by the amount which goes to nourish her progeny. The effect of this cause upon the condition of the blood appears to be similar to the abstraction of a part of it by venesection—that is, the removal of a portion of the red globules from her system, so as to cause a disproportion between them and the more fluid part of the mass.

These statements contain nothing more than the general facts; the physical causes upon which the effects depend ought to be traced, both by experiments and by inferences founded upon those experiments, much more minutely than they have hitherto been. As there are many grades between the effects observable in the blood, and *first* causes (into which it would be useless to enquire,) there is here a field, sufficiently wide, open for research.

In the mean time, it may be suggested as probable, that the coagulation of the blood is a *vital* process: that it is the last effort of the fluid to retain its identity, by drawing together into the smallest compass of which its forces are capable, those ingredients in it—the red globules and fibrine—in which reside the properties most essential to its character as living matter. If deprived of this last resource for some time after being drawn from its natural habitation—the channels in which nature destined it should live—it entirely loses the coagulating property, and no power with which we are acquainted can restore that property to it.

Influence of the Nerves in Inflammation.

It appears to be the opinion of many, perhaps the greater number of physiologists, that the nerves are the sole agents of vitality. If that be the case, they must also be the sole subjects of disease; because nothing but a living tissue can be liable to disease. The nerves and electricity are the two most convenient agents in nature, for the former will enable us to account for all the otherwise unaccountable phenomena in the animal body, and the latter will readily supply the defect of our knowledge respecting the rest of the material world. So useful and accommodating, indeed, are these two agents, that, in the absence of the one, the other, under the direction of some expert *savans*, has been made to supply its place. As a muscle will not move, and a gland will not secrete, when their nerves have been divided, the whole of each function has been attributed to these agents. But it happens, also, that neither muscular contraction nor secretion will be performed if the *arteries* of the muscle or of the gland be entirely obstructed. As a crowning proof, not only that the nerves and electricity are almost almighty agents, but that they are also identical, a muscle has been made to move, and secreting surfaces have been made to throw out fluid, by the application of electricity alone, after the presiding nerves have been divided. But it happens that the prick of a needle will produce the same effects. Will electricity cause the secretion of gastric juice, or any other juice, ten hours after death? or will the two agents combined move the fibres of a muscle at the end of that period after the heart has ceased to act?

But, although the nerves do not constitute the *whole* animal economy, still it will not be denied that they act an important part in it. When the combined acts of many agents are necessary to the performance of the functions of each, it becomes difficult to determine how much is due to one, and how much to another.

Now, it is impossible to separate all the nervous fibrils from the rest of the structure; it is therefore impossible to *prove* that a vital part would retain its life *for any time* in the absence of *all* nervous influence. We do not *know* that the nerves impart *no* properties to, and exert *no* influence on, the rest of the structure, after their communication with the brain has been cut off by division; but we know the fact, that a part will live, and that the blood will circulate through it, after the nervous communication between it and the brain has been destroyed. We know, also, that the visible phenomena of inflammation may be produced in a part so circumstanced—that, upon the application of stimuli, its vessels will expand, and admit more blood than they contained before.

But, as might be expected when we consider that the vital phenomena are dependent upon the combined operations of all the functions, the power of maintaining its vitality by a part deprived of its nervous communication with the brain has its bounds.

If the ischiatic nerve of a rabbit be simply divided, although its ends retract about the eighth of an inch, yet a union is very soon formed by the production of new matter. It is several weeks before the animal recovers its feeling, and gets rid of its lameness, but the nervous influence is sufficient to secure the vitality of the part. But if a considerable portion of the nerve be cut out, or if divided and its ends be placed in such positions as to prevent their union, the limb will generally slough in a week or ten days. The circulation in it will go on, apparently, tolerably well for a few days, but when it once begins to slough, the sloughing proceeds most rapidly, so that, in the course of two or three days, nothing but the bones and tendons remain.

These facts prove two things: first, that vitality continues in a part, and that its vessels will perform their functions, although its nervous communication with the brain be cut off; and, second, that the organic life of the arteries is not dependent upon the ramifications of ganglionic nerves following the course of the vessels from their origin in the chest and abdomen, as supposed by some physiologists; because, if so, there is no reason why the limb supplied by vessels so vitalised should die. If it be maintained that the (supposed) organic nerves are contained in the same sheath with the ischiatic nerve, then it is evident that they are not the agents which confer vitality upon the arteries and the mixed structure, for both the arteries and the other structures continue to live for several days after the sheath has been divided.

But that the nerves bear an essential part in the process of inflammation, is evident from the pain which usually attends the disease. As they are the sole agents of sensation, so must they be the media which acquaint the seat of sensation of the vital disturbance going on in a distant part. Moreover, the nerves, like all the other tissues, are preserved and renovated by the agency of the arterial extremities, and the elements upon which their very existence depends are regularly supplied to them from the common

pabulum. This furnishes the materials upon which the vessels exert their vital powers. Being thus dependent upon the due performance of their functions by the capillary vessels, it must follow that they suffer, like the other tissues, when these functions are disturbed.

PART II.

SURGERY.

GENERAL REMARKS ON LOCAL THERAPEUTICS.

The principle of the division of labour is carried to a considerable extent at the present day in all departments, and we are not aware that harm can arise from it in the medical profession, provided the members of that profession be originally well grounded in a knowledge of its general principles. In the surgical department, certain dexterity will be acquired by constant practice, which will give the possessor of it an advantage, in intricate operations, over those who are less often called upon to exercise their manual skill. This manual tact, however, is less required in modern times than formerly, for, happily, the application of a more correct knowledge of the principles of disease, and of the properties of therapeutic agents, to the removal of local affections, have rendered the employment of the knife seldom necessary now, compared with the frequency of its use some half a century ago. It must be considered, also, that the division of labour in the medical profession, however unobjectionable in itself, can only be applied to a small portion of the community—those inhabiting large towns—for the greater part must always rest satisfied with deriving the benefit of both medical skill and manual dexterity from the same individual.

But the grand principle, which should never be lost sight of, is, that disease is the same in its nature whether situated externally or internally. The first question to be determined is the seat of the malady; and the second is, in what manner is that seat affected? With regard to outward affections, we have the advantage of the direct evidence of our senses, which, combined with our previous experience, will give us at once a tolerably correct knowledge of their visible characters. We are capable of examining the condition of the part affected by the medium of the strongest evidence we can possess, and, therefore, except in instances of extreme ignorance, the two first difficulties, compared with internal diseases, are got over with satisfaction.

But, however simple this part of the business may appear, still, in order to turn our examination to practical use, it is necessary to know something more than that the leg is the limb affected, and

not the arm; that the part is red, not pale; that it is hard, not soft, &c. These, truly, are facts with which it is necessary to be acquainted, but they may be acquired as well by the most ignorant as by the most renowned surgical practitioner. He who is unacquainted with the properties, both natural and pathological, of the blood-vessels, and with the characters of diseases as they affect the different tissues on and near the surface of the body, may exercise his senses as long and as intensely as he please, without being able to form any rational idea of the nature and tendency of the malady.

If the disease be the same in its nature, whether occurring in the interior of the body, or on, or near, its surface, it will appear clear that those remedies which are calculated for subduing internal affections may be usefully employed in external diseases. In outward diseases we possess the further advantage of being able to direct our remedies to the immediate seat of the malady.

Now, it may be asked, in what manner do external remedies act in subduing disease? Before the question can be answered, it is necessary to say a few words respecting the nature of different diseases.

In every tissue of which the body is composed, there are certain processes unceasingly going on towards the preservation of its vitality and the maintenance of its structure. The first of these is the essential one by means of which the molecules of matter are deposited, and which is usually called the *secerning* process. The absorbent process may be considered in some degree as the opponent of the former, although in the healthy state, they rather succeed than oppose each other. Into the nature of that influence which the nerves exercise in these operations it is not our intention to enquire here, but that the three functions are essential to each other, is well known and generally acknowledged. Whether there be distinct vessels from the arteries themselves whose office it is to secrete, and distinct vessels from the veins whose office it is to absorb, is a subject foreign to our present enquiry; for the action of therapeutic agents may be equally accounted for according to either opinion. In health the two functions bear a certain ratio to each other. Those particles which are deposited by one set of vessels, are removed in their turn by another set, and an equilibrium is kept up. But during the progress of disease, this equilibrium is destroyed, and it is worthy of special consideration that the preponderance is almost always on the side of secretion. It is seldom that the diseased part is removed by absorption, for when destroyed by ulceration the process is generally that of gangrene or sloughing, which is a destruction alike of all its vital properties.

Whether the *secerning* vessels be a class distinct from the arteries, or whether the *secerning* and *secreting* functions be carried on by the capillary extremities of the arteries themselves, it is highly probable, as they are the agents which lay down the materials of all the structure, that they are implicated in every derangement

which takes place in any of the tissues. As, also, the elements of all the tissues are derived from the blood, which must pass through the capillary extremities of the arteries, the secreting vessels, if not these capillaries themselves, must be continuous with them, for the particles which constitute the structure must have traveled through both.

We have stated that when a part is undergoing disease, the secreting function generally overcomes the absorbent, which causes a preternatural deposit of matter. This is usually the first step towards the disorganisation of the structure. The question to be now considered is, how does this condition of the part happen? It may, and probably generally does, owe itself to causes: first, in consequence of the vital derangement of the capillary or secreting vessels, the calibres of these vessels enlarge, so as to enable more than the due proportion of fluid to pass through them; and, in the second place, as the absorbent function is the reverse of that of secretion, and must be performed by a *different* class of vessels, a similar derangement and relaxation must diminish their force, and thereby render their function *less* active than natural. For instance, if the vital derangement of the capillary extremity will cause this extremity, in consequence of its preternatural enlargement, to deposit *two* atoms in the time it could only deposit *one* in its natural state, it does not follow that a similar enlargement of an absorbent vessel, to whatever class it may belong, can *take up*, and transmit, twice the number of atoms in the same time. On the contrary, any loss of contractile power in the absorbents, (or the extremities of the veins, or imbibing pores, or whatever the nature of the absorbing apparatus may be) must render their function less active than it is in their natural state.

If the preceding view be correct, it follows that the same morbid cause which is calculated to *accelerate* the secreting function, has also a tendency to *reduce* the activity of the function of absorption. As in all cases of local inflammation the dimension of the capillaries is considerably increased, they have a morbid necessity of depositing more than the natural and healthy quantity of materials in the seat of disease; and as, on the other hand, the force of the absorbent vessels is diminished by the same cause, the inevitable consequence is, first, a simple swelling, and, ultimately, an organic change of structure.

As this is a subject of considerable importance in its bearing upon the principles here insisted on, we may be permitted to dilate a little on it, even at the expense of repetition.

Whatever the nature of the morbid cause of a local disease may be, one necessary consequence of it is a derangement of the vital functions of the part upon which that cause acts. If the cause be external violence, the texture of the structure may suffer at the same time that its functions are disturbed. In the next link of the chain of causation, a development of morbid phenomena occurs. The part becomes red, hot, swelled, and painful. In a word, it becomes *inflamed*. In some—indeed, in many—instances, when

the cause is conveyed through the medium of the blood, or when the disease arises spontaneously, (as the term is,) the derangement is so slight, or the nature of the tissue affected is such, that the symptoms of the malady are not of that degree as to bring them within the common acceptation of the term *inflammation*: still the operation of the cause is the same in kind, that is, the immediate effect is a derangement of the functions of the part affected. The first train of morbid phenomena having become developed, these phenomena may go on increasing; or they may remain nearly in the same degree, although, from their existence alone, the sensible change of structure must continue to increase; or, lastly, they may disappear, so that the part affected returns to its normal state. If the last condition should take place, it is a proof that the morbid cause has ceased to act, either from its having been removed, or from the tissue affected having become so changed in its modification as to be no longer sensible to its impression. If the morbid phenomena continue in the same state or degree, the original cause of derangement may be still acting on the seat of disease, or if removed, the derangement caused by its original relations may be of that kind and extent as to render it difficult for the part to return to its normal state by the mere effort of nature. Moreover, while in this condition of preponderance of one function over another, although the morbid phenomena may be moderate, still, as a preponderance does exist, great organic changes may take place in the tissues involved in the disease. Should the morbid phenomena continue to increase, there must either be an accumulation of the original cause in action, or the first derangement in the vital functions of the part affected must have been of a nature to act as a cause for further vital derangement, and thus proceed towards disorganisation, by every step or degree of derangement acting as cause for derangement further on in the scale. It is probable that this is the mode in which disorganisation takes place in most cases of gangrene, especially in those following inflammation resulting from external injury; for in such cases there can be no specific cause in operation.

It may be said that the morbid phenomena in all local diseases are analogous to those which characterise inflammation. That term is applied to them in different degrees or modifications, but these degrees or modifications are entirely dependent upon the tissue affected, upon the condition of that tissue at the time in relation to its natural state, and upon the nature of the cause which acts upon it and gives existence to the disturbance. As the properties of the arterial extremities vary almost without end in the different tissues, which tissues, also, are almost innumerable in variety, it is no wonder that their derangement should lead to organic changes so different in their character. According to the modifications of these properties in the different tissues, we have simple inflammation, which, according to its degree, may end in resolution, or in the destruction of the part; we have a purulent abscess; a cellular deposit of coagulable serum or lymph; a mellicerous

deposite; a steatomatous tumour; a sarcomatous tumour; a carcinomatous induration, and numberless other preternatural formations, but it is evident that in all these cases the deposition of materials predominates over the absorbent function, and the preternatural deposite is determined according to the peculiar modifications or properties of the vessels in the tissue specially affected.

Such being the condition of a part undergoing the process of disease, it is clear that the grand principle of therapeutics must consist in the means of restoring its natural functions—in restoring the equilibrium between the functions of secretion and absorption. Whilst the morbid cause continues in operation, this cannot be done; it is therefore a matter of necessity to remove that obstacle before a cure can be accomplished. But what do we know of morbid causes? We know but little, it is true; but, experience, and a collection of facts, assure us that certain articles possess the power of subduing diseases, and that the same articles will *generally* subdue diseases presenting similar phenomena in different individuals. It is true that we know but little of the cause abstractedly, but we distinguish its effects in relation with the visible structure, and from these effects, or morbid phenomena, we form our judgment of remedies which experience has proved to be capable of their removal. We are also able to draw some inferences respecting the manner in which these remedies accomplish the removal of the morbid symptoms.

Abundant facts, within our experience, prove that living parts are endued with an innate tendency to relieve themselves from the operation of disease, provided the exciting or morbid cause be removed. If this were not the case, it is difficult to account for the restoration to its normal state of an internal part which has undergone the process of inflammation; for internal remedies can do no more than neutralise the morbid cause, and the vessels must recover their vital contractility by some inherent properties connected with their own coats. Whether we consider bleeding, which, in addition to relieving the general vascular system, may be the means of abstracting a portion of the morbidic poison; or purging, which may expel it by secretion and excretion; or sweating, which may act in a similar way; or specific remedies, which act by neutralising the poison in the system—whether we consider one or all of these, we can only suppose them capable of removing that cause which first gave being to the vital derangement, and the vessels are left to the *vis medicatrix*—to the vital properties of their coats—to recover their lost contractility.

Now, in external diseases, we have all the remedial means within our power which apply to the subduction of internal maladies, with the addition of remedies calculated to restore, by direct application, the vessels to their normal state and to re-establish the equilibrium naturally subsisting between the two opponent functions of secretion and absorption. There is no doubt that chronic diseases depend, in the great majority of instances, simply upon the non-recovery of their contractile properties by vessels whose vital derangement was

first occasioned by an exciting cause.* Frequently, the innate vital properties of the vessels are sufficiently powerful to restore them to the state of health when the excitement is over; but such is not always the case; and the disproportion between the secreting and the absorbent functions continues, thereby giving rise to new formations, differing in their characters according to the causes already explained, namely, the nature and condition of the tissue immediately affected, and the morbid agent which first produced the vital disturbance.

Disease manifests itself by a combination of phenomena which vary considerably in their relative degrees in different cases. In acute inflammation, they exist in certain proportions, which, for the purpose of illustration, may be considered as a standard. We have here, pain, heat, redness, and swelling, in given proportions, and these morbid phenomena in combination according to such proportions constitute the sum total of the inflammation. But, as before stated, these proportions vary in different cases. The redness, for instance, may be intense, still the temperature of the part may be even below the natural standard; or the pain may be almost absent in a part which presents both redness and swelling; or the pain may be severe without increased heat, redness, or swelling sufficient to enable us to distinguish any difference between the seat of disease in that state and its natural appearances. All these differences exist even in the incipient stages of the affection, but they generally become more striking as the disease advances.

As the predominance of morbid action is on the part of the secreting function, the effect of the derangement usually is the deposition of new substances, which become organised in their turn, and which permanently alter the character of the original seat of the malady. These formations, as already observed, will have their characters stamped by the immediate tissue in which the disease originated; or, more properly speaking, by the peculiar modification of the arteries supplying that tissue. In one seat the deposit will be steatomatous; in another carcinomatous, or mellicerous, or mere induration from simple lymphatic deposition.

It is evident that, in all cases of this nature, the equilibrium naturally subsisting between secretion on the one hand, and absorption on the other, is destroyed, and that, generally, the disease must go on continually adding to the original quantity of morbid secretion. The vessels of the preternatural growth—which growth was commenced by vessels whose natural vital functions had been disturbed by a morbid agent—are, like those of every tissue, modified in a peculiar way according to the structure which they are destined to supply; and by this modification the identity of the new growth is preserved and nourished, in a manner perfectly analogous to the preservation and nourishment of all the natural tissues of which the animal body is composed. In this stage, the disease has assumed a character perfectly different from that which constituted it at its origin, and which consisted simply in derangement of the vital functions of the capillary extremitities: in fact, the

effect of the vital derangement—that is, the morbid deposite—has become the actual disease, and this disease has permanently established itself as a part of the living structure.

Supposing, then, in the incipient or early stage of local inflammation, the original morbid agent to have ceased to act, or supposing the inflammation or vital derangement, to have been the result of some external injury, the object is to restore the disturbed and weakened vessels to their original state. But, how is this object to be accomplished? What have we to fight with? The answer is, we have superabundant heat, pain, preternatural redness, and some degree of swelling.

Now, our knowledge of means capable of removing these morbid phenomena depends entirely upon observation and experience. But our knowledge in this respect is precisely the same in *kind* as that which informs us that an acid will change the properties of an alkali; for, in both cases, the result is anticipated from a similar result having been observed to follow the application of the same causes in a number of instances. If an evaporating lotion has been observed to subdue inflammation in a considerable number of cases, the mind becomes satisfied that such an application is endued with the power of changing the morbid properties constituting the disease in the same way as it satisfies itself that the properties of an alkali will be changed by the addition of an acid. This knowledge, then, satisfies us that the same remedies which are capable of removing *one* of those phenomena by which inflammation is characterised, may, also, remove *more* than one.

In acute inflammation, as before observed, the four elements of disease are co-existent. By the removal of one of these it is evident that the character of the malady is altered. For instance, if we reduce the temperature of the part, though the redness continue, still the disease has had its force considerably broken, and it affects the patient in a much less degree than it did at first. The pain diminishes as the preternatural heat continues to be abstracted, and what remains is only a *part* of the original affection—namely sub-acute or chronic inflammation, as it is termed. If, again, we empty the vessels of their contents by numerous scarifications, thereby relieving them of the preternatural quantity of blood within them, all the four elements constituting inflammation are reduced: the disease, as a whole, becomes much less severe—the *redness* is less, the *swelling* is less, the *heat* is less, and the *pain* is less.

In inflammation of an acute character; indeed, in inflammation of all degrees, the principal indication, after the removal of the morbid agent, is to restore the calibre of the vessels of the inflamed part to its natural standard. This indication is usually fulfilled by one or more of the following means: 1st, local bleeding; 2d, evaporating lotions; 3d, poultices; 4th, fomentations; 5th, liniments; 6th, escharotics; 7th, pressure. Specific applications to cutaneous affections are not here included.

Local bleeding. It is evident that local abstraction of blood,

whether by leeches, by scarifications, or by incisions, can only afford relief in a mechanical way, by enabling the weakened vessels to unload themselves. Although each capillary tube is not divided, yet, by the abundant anastomosis which exists between these vessels, every tube in the inflamed part may be relieved by free scarification. Of all local remedies, bleeding is, doubtless, the most efficacious; but it must be considered that by the removal of one disease it creates another injury, which experience proves to be occasionally troublesome, if not dangerous.

In the most severe cases of inflammation, that is, in cases where the vital contractility of the vessels has been materially reduced by the amount of morbid derangement, the motion of the blood becomes so diminished as almost to cease altogether. Indeed, it occasionally does cease, and the consequence is gangrene of the part affected. In cases of this description, it is next to impossible for the vessels to resume their contractile powers without being first relieved of the weight pressing upon their internal surfaces, and local abstraction of blood is, perhaps the most efficient mode hitherto employed of affording them that relief. Having been eased of the internal pressure, an opportunity is afforded them to recover their tone, by virtue of their innate powers as vital parts, at the same time that the mischief arising from the preponderance of deposition over absorption is in some degree suspended.

Evaporating lotions. We have already remarked, that agents which are capable of removing one of the phenomena of inflammation may also reduce or remove one or more of the others. Increased heat, or augmentation of temperature, not only forms one of the striking phenomena of the disease in its acute character, but it must also act as a cause in keeping up the derangement. It is unnecessary here to repeat any remarks which may have been already made respecting the physical cause of the increased temperature, but as it is an essential ingredient in the constitution of the malady, its reduction would be an object of much importance did it merely exist as a part of the disease; but as the natural action of caloric upon bodies is to expand them, or to induce their particles to separate to a greater distance from one another, and as the condition of the capillaries in inflammation is already that of preternatural expansion, it must follow that any quantity of heat added to them, beyond their natural measure, will tend to increase their dilatation still more. This being the case, it is doubly desirable to reduce the preternatural temperature of the inflamed part, so as to bring it as low, at least, as the natural standard, and experience has taught us that the only way of lessening the temperature of a body is to apply another body to it colder than itself, or a body which, by changing its capacity for heat, creates a degree of cold around that whose temperature we wish to reduce.

Heat and cold are merely relative terms. Whether there exist two agents capable of neutralising each other by any physical properties, or whether cold be merely the absence of heat, is a question

not worth discussing in this place, because it is sufficient to know the effects on the living body of the different degrees of temperature measured according to the common method. Appreciated in this sense the two terms are merely relative; but observation proves that the effects of the caloric agent are very different on living parts according to its degree. If the temperature of a part be below the natural standard of the heat of the blood, that part can hardly be said to be in a state of inflammation, according to the definition of the term, for preternatural heat is as essential an ingredient of the disease as pain or redness.

As the vital functions of a part become deranged if its temperature be raised preternaturally high, so will they also be impeded if the temperature be reduced below a certain degree. We find morbid affections amounting even to sloughing and gangrene, not only without any elevation of temperature, but even as a consequence of too great a reduction of heat. The toes often become "chilled," and, as a consequence, they slough, from exposure to low temperature. In these instances, we find some of the elements of inflammation without the others; we find redness and swelling, but the increased heat is wanting; and the pain in many cases is so slight as not to be complained of, even when the part is on the verge of gangrene. In cases of this description, the contractility of the capillaries is so reduced, and their calibres, consequently, are so enlarged, that the motion of the blood within them ceases: the fluid coagulates, and gangrene or sloughing is the only remedy which nature can apply for the preservation of the rest of the limb.

Although the general principle upon which lotions are employed for the cure of inflammation, is that of reducing the preternatural temperature of the inflamed seat, still if medicated they may also act specifically on the vessels and nerves of the part, by actual contact, or by imbibition or absorption. The animal body is subject to physical laws, like all other bodies, and its structure is liable to be affected by the external agents which surround it. Heat, light, moisture, and all other physical agents, continually influence its condition by being admitted by imbibition through the porosity of its structure; and, according to the same laws, substances artificially applied to its surface will exert their properties upon it, whether these properties have a curative or a deleterious relation with it.

Poultices. Being subject to physical laws, like matter in general, the animal body may be affected in different degrees by the same agent under different circumstances. If a piece of iron, whose temperature is a few degrees above that of the blood, be applied to the skin, the effect is very unpleasant, and the functions of the tissues would be deranged if the temperature were still a little higher; whereas water, or especially atmospheric air, whose temperature is considerably greater will be borne with perfect impunity, and even without much inconvenience. Again, if the air be dry, the body will

bear a great degree of cold without inconvenience, whereas in a moist atmosphere a degree of cold not near so great becomes very unpleasant. It is upon this principle, we conceive, that poultices are more advantageous in some cases than evaporating lotions, and less so in others. When the preternatural heat is very great, its reduction is more readily accomplished by lotions, which, by rising into vapour, abstract the caloric more readily and quickly; whereas if the temperature be only a little above the natural standard, the rapid abstraction caused by the lotion reduces it so low as to occasion pain, or at least an unpleasant sensation, in the part affected. A moist poultice, although presenting an evaporating surface, transmits the heat but slowly from the inflamed part, and continually retains a part of it in its substance, thereby contributing to render its temperature more equable. In this respect it is much superior to an evaporating lotion, and considerably more efficacious in many cases of inflammation.

A medicated poultice, like a medicated lotion, may exert a direct influence on the diseased vessels by imbibition or absorption.

Fomentations. Unless medicated, fomentations cannot be supposed to act otherwise than by softening the cuticle and promoting a degree of perspiration from the part to which they are applied. Experience proves that the effect of dry heat upon the skin is very different from that produced by a combination of heat and moisture. The sensation occasioned by the application of a hot fomentation, even to a part already of a higher temperature than natural, is generally agreeable to the patient.

Heat combined with moisture tends to promote perspiration from the surface to which it is applied, thereby in some measure to relieve the over distended vessels of a part of their fluid contents. The cuticle over the inflamed part is generally dry, and its pores are filled up, probably, by a portion of the lymph thrown out by the vessels underneath, and which has become coagulated. Whether this be the cause or not, it is certain that the perspiratory exsudation does not go on so fast as in the healthy state of the part, and that warm fomentations possess the property of relieving the density of the cuticle, so as to enable it to allow the exsudable serum to pass more readily through.

Embrocations and liniments. It is seldom that remedies of a "stimulating" nature are applied to a surface undergoing acute inflammation. Indeed according to the composition of this species of application, the remedy, if employed, might be more unendurable than the disease itself. But, that spirituous fluids may not only be safely, but beneficially employed in local inflammation, even of the most acute kind, is proved by the effect of oil of turpentine in cases of burn and scald. It is the addition of ammonia, camphor, essential oils, and other ingredients, to the spirit, that renders embrocations generally unfit applications for inflammation of the acute form. In the employment of remedies of this description—in fact, of all remedies—it should never be forgotten that the same ingredients

may be congenial or uncongenial to the feelings, according to the strength or intensity in which they are applied. Pure alcohol, or a concentrated solution of ammonia, would, probably, raise the cuticle and produce a blister, whereas, diluted, they would only gently increase the exsudation from the extremities of the vessels. Embrocations are most commonly used with the view of removing the *effects* of inflammation, namely, the thickening and induration dependent upon the consolidation of serous lymph in the interstices of the structure; and, for this purpose, both they and *liniments* are medicated according to the discretion or the fancy of the practitioner. As a proof that such applications have their effects, not only on the local seat of disease, but also on the system at large, we find that mercury thus introduced will very readily affect the gums, and cause salivation.

Escharotics. The employment of escharotics, or rather of the nitrate of silver, in inflammation has been in vogue for some years, and was first introduced by Mr. Higginbotham, of Nottingham. The immediate effect of the application of the caustic to the inflamed surface is the conversion of the cuticle into a dry, black scale or crust, which peels off in a few days, leaving a new, delicate layer of cuticle exposed underneath. That the remedy exerts a powerful effect on the arterial extremities of the part, is proved by its causing an entire separation between the cuticle and the skin whose vessels secrete it. Various conjectures respecting the mode of action of this application have been offered, but none of them appear very satisfactory. Mr. Higginbotham thought that its efficacy might depend upon the exclusion of the air from the inflamed surface, owing to the conversion of the cuticle into an impenetrable covering. But we find that internal parts, such as the peritoneum, &c. to which the atmospheric air has no access, are still liable to inflammation; and, moreover, it can hardly be supposed that an agent which is necessary to the surface of the skin in its healthy state can be injurious to it in a state of inflammation.

As a ready way of getting out of the difficulty, the lunar caustic, like a hundred other applications, has been said to act as a "stimulus" to the part, and to excite the vessels to a "healthy action." This, in plain terms, is saying nothing more than that it does good—that the inflammation gives way where it has been applied. The term "stimulus" is employed so vaguely that no correct idea can be formed of what is meant by it. We are told that cold stimulates the vessels to contract; that heat stimulates the part to inflame, that ammonia stimulates the capillaries to enlarge and the skin to blister; that lead stimulates them to contract, and the skin to corrugate. Again, with respect to "healthy action:" we only know that the "action" of the vessels is healthy from the part supplied by them being healthy; which amounts to nothing more than saying that the part is in its natural state.

Simple Pressure.—That compression is capable of producing a decided effect on the living structure, is proved by the fact that a

bandage long worn round a limb will cause that limb to become materially smaller than natural. It may be asked how does pressure act? In reply it must be admitted that it either diminishes secretion or increases absorption, or both; for we know of no other way in which the reduction of size can be accomplished. We have already stated it as probable, that the same agent which causes the capillary tubes to enlarge so as to exude more concretible matter than they do in their normal state, might also produce an enlargement of the absorbent vessels, thereby rendering their function less active than natural. If such a view be admitted, the reverse may also be true, viz. an agent which causes a diminution of the diameter of the secreting capillaries, or secreting tubes, and reduces their calibre below its normal standard, will also act in a similar manner upon the absorbent vessels, and occasion their function to become more active than natural. Now, compression will accomplish both these purposes. It acts equally on all the vessels, both secreting and absorbent, and the effect is, that the double object is obtained, namely, a diminution of the function of the one class, and an augmentation of that of the other.

In inflammation possessing no specific character, after the exciting cause has ceased to act, and when only a relaxation of the capillaries, from diminished contractility, remains, a gentle and equable pressure on the inflamed part is one of the most efficacious remedies in common practice. Its effect, evidently, is mechanical. It can in no other way act than by occasioning a diminution of the calibre of the vessels, thereby preventing their depositing a preponderance of molecules over those taken up by virtue of the function of absorption. The consequence is, that by relieving the coats of the blood-vessels of a part of the weight pressing upon them internally, those vessels are more free to resume their contractile power, and the equilibrium between secretion and absorption is re-established.

An effect similar to that of pressure may be produced by obstructing, by ligature or otherwise, a principal artery supplying a part.

The structure loses a portion of its sensibility and of its temperature, and the part becomes pale and wasted. These are conditions the very reverse of those by which inflammation is characterised, and such being the case, the inference, *à priori*, would be that a remedy calculated to bring the inflamed part into such a state must tend to remove the inflammatory process going on in it.

Upon the therapeutic properties of those remedies which are generally termed "*specifics*," it is not necessary to dilate here, as they apply more particularly to a few diseases which propagate their kind by contact, or by the transfer of a portion of the morbid matter from one person to another. The only idea we can form of a specific disease is, that the morbid agent, which first gave rise to the malady, continues in operation until subdued or neutralised by some other agent capable, by affinity, of converting it into another form, thereby altering its properties.

ON THE THERAPEUTIC PROPERTIES OF IODINE.

Iodine, as a remedial agent, has been in the hands of the profession for many years, but the object of the present work is to show that its application may be extended with much benefit to diseases and local injuries in which it has hitherto been very limitedly, if at all, employed. The various local affections in which we have used it during the last eleven years, both in hospital and private practice, induce us to set it forth as by far the most efficient topical application in our possession. The mode in which we have generally employed it, has been that recommended by Mr. Buchanan, namely in the form of tincture; in which form, *certainly*, it possesses remedial properties which it does not exhibit in any other. Why this should be the case we do not profess to know, but long experience proves such to be the fact.

In urging a remedy on the attention of the profession, it is necessary at the same time, to caution the members of that profession against the indiscriminate and indiscreet use of it. Many valuable medicines have fallen into disrepute, and have been altogether discarded from the list, owing to their having been mismanaged or abused. Iodine, though not a *new* remedy, has by no means yet had its effects on the human system fully tested. Properties have been attributed to it of which it is quite devoid, while, on the other hand, it is endued with many therapeutic virtues which it has not been generally known to possess.

It is not the intention here to treat of iodine as an internal remedy, but we may be permitted, in passing, to observe that we have never witnessed it to produce the effects attributed to it on the testes and mammæ, namely, causing the absorption of these glands. We have administered it internally very extensively, and in many cases, for several months together, yet *not in one instance* did it reduce the size of the glands already mentioned. We may also be allowed to state that we have been much disappointed in it as an internal remedy, more especially in scrofulous affections, for which it has been cried up almost as a specific. Its curative effects in bronchocele are so well established as to render it unnecessary to do more than mention the fact; but, with the exception of that affection, its medicinal virtues, according to our experience, are rather limited, when internally administered. It is however proper to mention, that we have found it one of the most useful remedies in cases of long continued dyspepsia, and in some other affections of the mucous membrane of the digestive canal. It is probable that it acts in these cases by immediate contact, and not through the medium of the circulation: be that as it may, its curative effects are very striking in chronic affections of the lining membrane of the digestive tube.

But the principal object of this essay is to point out the benefits of iodine as an external application; and, in doing so, nothing shall

be stated which repeated observations have not proved to be correct. We are well aware that when a single remedy is set forward as a cure for a great number of diseases, it is apt to be looked upon with great distrust by the profession, and that those who happen to recommend it are liable to be charged with something like empiricism. As well might those who prescribed mercury in a variety of diseases, or those who prescribe sulphate of magnesia, or carbonate of soda, or opium, in a variety of affections, be charged with empiricism. In truth, what do our common external applications amount to? Chiefly to lotions and poultices; and practitioners generally do not much vary the characters of their lotions and poultices in different local affections. There are few external diseases, or local injuries, for which both of these are not employed in their turn. If a simple evaporating lotion be applicable to cases of phlegmon, of erysipelas, enlargement of the joints, scrofulous swellings of the glands, lacerated, contused, and punctured wounds, and a variety of other inflammatory affections, both of the skin itself and of the internal parts situated near it, why should not another remedy apply equally to a number of similar maladies? The properties of remedial agents can only be judged of from the effects they produce. No one could tell *à priori* that sulphate of magnesia would purge, and that carbonate of lime would constipate the bowels. In like manner, the medicinal virtues of opium, hyoscyamus, prussic acid, mercury, and all other remedies, have been discovered by observation of their effects respectively on the animal system, for they exhibit no external qualities which could lead to a fore-knowledge of their relations with the living body.

Now, extensive observation, and the experience of several years, have proved iodine to be a most efficacious remedy in a great variety of local affections—*much more* efficacious than any of the remedies noticed in the last section. It is very easy of application, mild in its effects on the nerves of the part with which it comes in contact, and capable of being modified in the degree of its strength, so as to suit it to the intensity of the disease and natural quality of the skin of the patient.

Both at the infirmary and in private practice we are in the habit of using the iodine in two forms, but by far more frequently in that of tincture in alcohol. The tincture is made by dissolving forty grains of iodine in an ounce of rectified spirit; and its strength is afterwards reduced, when necessary, by the addition of more spirit. The other form is an iodureted solution, which is made by dissolving thirty-two grains of iodide of potassium (hydriodate of potass) in an ounce of distilled water, and by adding to the solution eight grains of iodine. With this iodureted solution a lotion is made by the addition of distilled or of common water, varying in strength according to circumstances, from one eighth to one fourth of the former.

The strength of the remedy must be determined by the quality of the skin, in the first place. When the skin is thin and delicate in

texture, the tincture should be reduced to half its strength, otherwise the cuticle may be raised in blisters, which should always be avoided if possible. When, on the other hand, the cuticle is thick, and of a coarser texture, the tincture may be applied undiluted. In the second place the strength must be regulated by the nature and intensity of the disease. If, for instance, we have an acute inflammation of any part, and if, most particularly, it shows a disposition to slough, the remedy must be used in its full strength. In all cases of sloughing ulcers; in all cases of irritable ulcers; in all cases of lacerated, contused, or punctured wounds, the strength of the tincture should *not* be reduced—it should be applied undiluted in the first instance; but when the slough has separated, or the irritability has ceased, and when the remaining object is merely to promote the growth of granulations, then the strength ought to be reduced about one half. In induration of the glands, in chronic affections of the joints; in inflamed breast; in fact, in all affections whose seat is *under* the substance of the skin, the tincture should be employed in its full strength, unless the skin covering the seat of disease be very delicate or irritable—we mean *naturally* irritable, for the remedy itself would soon deprive it of any *morbid* irritability.

Suppose we are called to a case of severe inflammation of the leg, in a stout, robust person; the limb is intensely red, hot, swollen, and glossy, all the way from the toes to above the knee; it is double the size of the corresponding one; and so painful as to disturb the general health—as to cause quickness of the pulse, white tongue, thirst, &c. We immediately *paint* the whole limb with the tincture of its full strength, extending its application from the toes to several inches above the upper margin of the inflammation: the remedy is applied with a camel's hair brush. This is all the local application requisite for the present. The limb is directed to be kept in an horizontal posture, and either to be very lightly covered over with a sheet—which must not come in contact with the skin—or else to be left exposed, according to the temperature of the apartment. In less than twenty-four hours—in less than twelve hours—the swelling will be found to have diminished. At the end of twenty-four hours the skin will be seen much corrugated, showing its contents to have become less in bulk, and the circumference of the limb will measure some inches less than the day before. The diminution will be found to have taken place more particularly towards the upper part of the swelling. We now repeat the application of the same strength. In another twenty-four hours the reduction of the swelling will have gone on rapidly, and only a remnant of the disease will be found to exist. The strength of the tincture must be now reduced to one half, and its application continued daily, or less often, according to circumstances, until the limb is well. After the second or third applications of the tincture, we sometimes brush the limb over with spirit of wine alone, so as merely to dissolve the iodine which remains on the surface of the skin.

The above is the usual effect of the remedy in cases of pure

phlegmonous inflammation, but it varies, of course, in different constitutions. The variations, however will be found in the *degree* only of its *curative* effects in different cases; it may be employed in *every* case, with the full confidence that *benefit*, and not *harm*, will be the result. The only inconvenience we have ever witnessed to arise from its use has been that of causing, now and then, a slight watery eruption on the surface of the skin, and a degree of itching in the part, when employed too strong, or when persevered in too long. These eruptions have invariably given way in a few days to a simple evaporating lotion of spirit and water.

The application of the tincture is almost always followed by a desquamation of the cuticle, leaving the part covered by a new, clean, healthy layer of cuticle. This takes place when it has been applied to a healthy part. On the healthy skin it generally causes a sensation of heat, and some degree of smarting after a few minutes; but frequently no smarting or pain is felt—nothing but a slight and agreeable warmth. When applied to a part undergoing the process of inflammation, the pain which forms one of the essential characters of the disease, soon becomes deadened, and is succeeded by a sensation of warmth, which, in a few hours, ceases also and leaves the patient free from any sense of pain or heat in the seat of disorder. If applied to the surface of a sloughing ulcer, or to a part on the verge of gangrene, or to a foul irritable ulcer, it is seldom felt by the patient. On a healthy ulcer it produces, generally, a very sharp, smarting pain for a minute or two, but the pain almost immediately ceases and leaves the part in a comfortable state. The same sensation is produced by it when applied to the surface of a recent lacerated wound, or to any healthy raw surface.

If any itching, or a slight blush of the skin, should follow the repeated applications of the remedy, especially on the lower extremities, it should be discontinued, otherwise the cuticle will rise into small watery pimples, and will tease the patient for a few days; but this effect is produced by it on the *healthy* skin only—when applied, for instance, to the skin covering a diseased joint, or when any induration or swelling is situated under the skin—for we have never found it to blister the cuticle and to cause exsudation of lymph from the surface of an *inflamed* skin.

Neither the iodureted solution, nor the tincture of iodine, as directed to be prepared by the London Pharmacopœia, is applicable to cases of inflamed or of ulcerated skin, for they both contain hydriodate of potass. In either of these forms the iodine is far preferable for *internal* use, to being dissolved alone in alcohol; for in the latter form it nearly all precipitates when water is added to it, whereas the hydriodate in combination with it renders it perfectly soluble in water or watery infusions. As an external application, however, the hydriodate renders it acrid, and gives it a tendency to inflame the skin and to cause a considerable degree of smarting when brought into contact with any ulcer or ulcerated surfaces. The iodureted hydriodate lotion is only applicable to

affections whose seat is under the skin, such as diseases of the joints, scrofulous tumours, glandular indurations, &c.; but even in most of such cases the tincture is far preferable, when the patient is so situated as to enable the practitioner himself to apply it as often as necessary. We state this proviso, because we never trust the employment of the tincture to the patient.

The iodured hydriodate solution, like the tincture, produces a desquamation of the cuticle if used strong, but this only becomes observable some time after the lotion has been left off, and the skin has become dry. As stated before, we seldom use this form of the remedy, except in cases where it is not convenient to see the patients so often as required for the application of the tincture, because the latter, when properly regulated in its employment, proves by far the more efficacious of the two in most instances; but if indiscreetly used, on the other hand, it is more likely to cause an unpleasant sensation in the skin of the part to which it has been applied. The solution forms a very ready mode for an iodine gargle, in cases of ulcerated sore throat. Diluted with from seven to ten parts of water, with the addition of honey, it forms one of the best kinds of applications of that description. But even in affections of the mouth and throat the tincture is preferable—it is less nauseous to the patient, and quicker and more efficacious in its curative effects.

We have already stated, that a knowledge of the effects of different substances on the living body can only be acquired by observation. There exists nothing in the external qualities of sulphate of magnesia, of jalap, of colocynth, of scammony, of elaterium, of Glauber's salts—which are all so dissimilar in their outward form—to enable us to foretell them capable of quickening the peristaltic action of the intestinal tube, and of increasing the secretion on the surface of its mucous lining; nor could any one judge *à priori* that ipecacuanha, sulphate of zinc, or tartarised antimony, would cause the stomach to eject its contents, for these articles, also, possess few outward qualities in common. Their medical properties become manifested only in relation with the living parts. When so tested, their effects prove to be pretty much the same on by far the majority of mankind. In 99 cases out of 100 of the whole community—we might, perhaps, say in 999 out of every 1000—the effects of the articles enumerated above would be the same.

If substances administered internally are so constant in their effects on certain inward parts, there is no reason why outward applications should not be also constant in their effects on the external parts. It does not follow that either will cure the disease for which it is administered, or applied; but as Epsom salts exert an effect generally alike on the mucous membrane of the intestines, we can discover no reason why the analogy should not apply to the *skin*, which is also a continuous tissue, like the mucous. That the disease is not cured, or modified, in all cases, is not owing to any

uncertainty in the action of the remedy, but owing to that not being *the* remedy which bears a relation to the special tissue constituting the immediate seat of the malady. Experience proves the analogy: it proves that nitrate of silver will convert the skin into a black colour, and will destroy its texture if applied sufficiently intense: that pure potass will dissolve all the living tissues: that cantharides will raise the cuticle: that mercury, and other substances, will penetrate the skin and enter the general system, &c. In fact, all substances capable of making any impression on the surface of the skin, act alike on the great majority of mankind: the difference is in degree only.

Now, iodine, in the form of tincture in rectified spirit of wine, is capable of producing—does produce—certain effects on the skin, and on the living parts generally, when applied to them. The nature of that effect can only be known from observation. Experience proves the effect to be of such a nature as to remove inflammation; as to enable the living parts readily to throw off any sloughs which may be attached to their surface; as to make granulations spring up rapidly, so as to fill up the loss caused by the sloughing; as to promote the absorption, or cause the removal of interstitial deposits situated in the cellular membrane under the skin; and as to accomplish various other changes in the condition of morbid parts, which will be more particularly specified hereafter. That tincture of iodine is not as *certain* of doing these things as sulphate of magnesia is of relaxing the bowels, is owing to the one exerting its effects on a *healthy* surface, and to the other acting on a *morbid* part. The effect of iodine on the healthy skin is as determinate as that of Epsom salts on the mucous lining of the intestinal tube; namely, it will cause a certain degree of warmth to the sensation, followed by a slight smarting, and, lastly, by a desquamation of the cuticle. When the structure of parts has become changed, as a *consequence* of morbid action, it is doubtful whether there be in nature a remedy capable of restoring them to their normal state; but as the first effects of disease often act as a cause for further disease—in other words, as vascular deposits, or structural changes, have a tendency to keep up irritation in the parts where they are situated, thereby tending to promote further morbid changes—it is highly desirable to possess the means of modifying the properties of the vessels of the altered structure, in such a way as to prevent their depositing more morbid matter, and, if possible, to induce them to remove some of that already deposited. Experience proves that we possess such means in the remedy whose recommendation is the object of this essay.

Admitting the facts above stated, it is, perhaps, sufficient to know that such effects follow the application of the remedy in the majority of instances, without attempting to account for its *modus operandi*. If we offer an opinion respecting the rationale of its operation, we, at the same time, respectfully insist that the reader do not take the failure to give a satisfactory *reason* for its mode of acting,

as a justification for rejecting the practical *facts* respecting its effects.

Disease may be considered in two stages: first, the part still suffering under the influence of the morbid cause which first produced the local derangement; second, the part merely existing in a state of derangement, as a *consequence* of the previous action of a morbid agent. The first condition may be illustrated by the morbid process of a chancre; by the local operation of the variolous, or of the vaccine virus; by the progressive march of lupus, &c. In these cases, and various others, the cause or morbid agent appears to be of a specific nature, and to increase in magnitude and energy as the disease advances: in fact, the agent of disease appears to live and feed upon the living parts in which it resides. In other cases, the first action of the morbid cause produces a vital derangement of the part with which it comes in contact; and the agent then either becomes absorbed or swallowed up in the effect, by entering into new affinities, or else is eliminated from the body among the secretions. We will first consider disease in its second state.

When the seat of disease has relieved itself from the operation of the original cause of derangement, it still generally suffers from the effects of that operation. The capillaries are in a relaxed state; they contain more than their due proportion of blood; there is a tendency in the part to preponderate in secretion over absorption; and its nervous functions, dependent upon the integrity of the functions of the capillary extremities, do not resume their normal condition. Moreover, there may have taken place a deposite of lymph in the interstices of the structure, so as to constitute a new cause of vital derangement.

In such a state of things, it appears reasonable that the first step towards restoring the part to its natural state, should be to induce the capillary vessels to resume their contractile power, so as to enable them to free themselves from their disproportionate burthen. That the application of the tincture of iodine is endued with the virtue of accomplishing that object, is proved by the fact that the swelling of an inflamed limb very rapidly subsides as a consequence of its application. We say as a "consequence" of its application, because when a similar occurrence invariably takes place under similar circumstances, we have a right to assume that there exists a necessary connection between them.

As to the *manner* in which the remedy acts on the morbidly dilated vessels, we are just as ignorant—but not more so—as we are of the nature of the action of muriatic acid on a piece of marble: all we know is, that one agent possesses the innate virtue of modifying the properties of the other in either case; and experience alone can teach us the result, or acquaint us with the nature of the product of the change.

It is a fact, within the knowledge of every practitioner, that arteries exposed to atmospheric air will contract, and diminish—nay,

close—their canals. When the stump of a recently amputated thigh is exposed, thousands of vessels bleed at first. At the expiration of a minute not one in a hundred of them will allow any blood to escape. At the expiration of three or four minutes more, perhaps the whole number will have ceased bleeding, if the principal branches shall have been secured. Nothing more will appear than the oozing of colourless lymph from the whole surface. Now, this fact must satisfy every one, first, that vessels of considerable size *are capable* of obliterating their canals, by means of some contractile power inherent in themselves; second, that the action of this power may be encouraged or excited by the application of physical agents. In the instance specified, the agent which influences their contractile power is the atmosphere. If atmospheric air is capable of producing such an effect upon the vessels, there is no reason why other agents should not be able to produce a similar effect. In truth, we find, as already stated, that iodine, in the form of tincture, possesses the property of doing so; and the effect of its application to an inflamed and swollen part is a diminution of the redness, as well as of the swelling, in consequence of the previously over-dilated capillaries having recovered a great portion of their contractile power.

It was hinted at in the last section, as probable, that the same means which are calculated to cause diminution of secretion, have also a tendency to increase the activity of the absorbent function. The grounds of the inference were there stated. The fact is indisputable that certain agents do occasion the removal of interstitial deposite, at the same time that they subdue the inflammation, which is the cause of that deposite. In doing so, they must accomplish something *more* than restoring the balance between secretion and absorption, because a mere restoration of the balance could only serve to subdue the inflammatory condition of the part, leaving the morbid deposite where the over-dilated capillaries threw it out. Before the extraneous matter can be removed, after once having been deposited, there must be a preponderance of absorption over secretion—the excess must be transferred from the capillaries to the absorbents, or whatever agents there be which take up the matter.

Among the agents capable of producing the effects above mentioned, iodine is by far the most efficient with which we are acquainted. It not only subdues the inflammatory state of the part much quicker than any other local application, but it also reduces the swelling, and causes the absorption of morbid deposites, much faster than any other remedial agent. It should, however, be borne in mind that it will not prove successful in *every* instance, any more than other remedies.

According to the same principle that it subdues inflammation by exciting the contractility of the capillaries, iodine causes the living vessels to cast off the slough from the surface of foul ulcers. The slough is nothing more or less than a portion of the animal struc-

ture which has suffered death from the intensity of the disease. In consequence of the preternatural expansion of the vessels, the blood within them entirely stagnates; and when that condition occurs in all the vessels of a part, however extensive or however limited, its death is the necessary effect. Now, although the preternatural dilatation often extends a considerable distance from the slough, still there must be a point where the dead and the living parts meet—a point where the blood is all but at a stand still, yet where it continues to move. As the stagnation of the blood, and, consequently, the death of the part, are owing to the total loss of contractility in the capillaries; it seems reasonable that a remedy capable of producing their contraction should enable them to resist the progress of the sphacelus, and to separate themselves from the dead matter. The separation takes place at the point of junction between the living and dead parts of the vessels. The living parts of the tubes having recovered some of their contractile power, they gradually diminish their calibre; the velocity of the blood in them consequently increases, which tends to add more and more to their vitality; they effuse a purulent fluid from their extremities, which serves as a medium of division between the dead slough and the living structure; and the consequence is a separation of the dead from the living part, leaving a healthy granulating surface exposed.

But, supposing the morbid agent still to exist in the seat of disease, is the remedy capable of neutralising it, and of rendering it innocuous to the living tissues? In reply, it may be said that we have no means of proving, indisputably, whether or not the original cause of the derangement be still in operation. The inflammation may be of that kind commonly called “spontaneous,”—that is, it may arise from a cause which cannot be discovered: in one instance, it will cease without any artificial aid; in another, it will run on to the destruction of the life of the part affected. In the former case, the cause ceases to operate of its own accord: even in the latter we cannot be positive that the morbid agent has continued in operation until gangrene has actually ensued; for its first impression may have been of such nature as to produce so great a derangement in the functions of the part as ultimately to lead to its death, although the original cause no longer continues to act. This point may be illustrated by the effects of mechanical violence: the seat of violence may not be destroyed at once, but its vital functions may be so disturbed as necessarily to lead to its death shortly afterwards.

Under these circumstances it is impracticable, in common inflammation, or its consequences, to determine whether the original morbid agent still continues to exert its influence on the seat of disease, because, although the malady appears to progress in its march, yet that circumstance may be owing to the extent of the original disturbance, which disturbance acts as a fresh cause in perpetuating the inflammation. The only affections, therefore, in

which we can infer the morbid cause to be still in operation, are those termed "specific."

Now, the agent, or virus—or whatever the cause may be called—of a specific disease, must be different in every species of disease. The syphilitic differs from the variolous, the variolous from the psoral, &c. As this is the case, it is not probable that any *one* remedy exists in nature capable of neutralising the cause of *every* disease. It can only be determined by experience *what* affections of a specific kind are able to be subdued by the application of a remedy. Those in which our own experience has proved the tincture of iodine to be beneficial, will be noticed under their proper heads; but we admit that our experience of its use in specific diseases has not been so extensive as to enable us to speak with positiveness with respect to its curative properties. The facts must be taken as they are: we have no wish to magnify them.

ERYSIPELAS.

In pure erysipelas, the tissue immediately affected appears to be the skin; but in most instances the malady is of a mixed nature, involving both the skin and the cellular membrane underneath. When it presents itself in its simple form, the skin looks of a bright crimson colour. The redness disappears under the pressure of the finger, but very soon returns after the pressure has been removed. There is a burning sensation in the part affected, but no sense of throbbing, as felt in phlegmonous inflammation. The peculiar burning or smarting sensation experienced in this disease, is owing, doubtless, to its being so specially allied with that tissue in which the nerves of touch spread out their extremities; and the absence of throbbing may be easily accounted for, because the vessels engaged in the inflammation are so exceedingly small and minute, that, even at the utmost extent of their expansion, they are not large enough to impart a throbbing sensation either to the finger when applied to the inflamed part, or to the feel of the patient himself. But, owing to the countless number engaged, and to their being situated so near the surface, the skin presents a colour of the brightest crimson.

This variety of the disease generally spreads to a considerable extent over the skin, and, when severe, it gives rise to a separation of the cuticle, in the form of bullæ or blisters, which contain a serous fluid, generally of a yellowish colour, but sometimes almost transparent. When these blisters give way, and the fluid escapes, incrustations are formed on the surface, under which ulcerations not unfrequently take place.

There is generally a considerable degree of constitutional derangement accompanying cutaneous erysipelas. The tongue is coated; the pulse is small and quick; there are thirst, uneasy sensation about the præcordia, and a universal feeling of languor and debility. The severity of these symptoms is often disproportionate

to the apparent extent and severity of the local inflammation; which, probably, is owing to the peculiarity of the tissue affected, namely, its being that upon which nerves of sensation are extensively distributed.

The head and face are the parts most subject to erysipelas when it arises from constitutional causes: indeed, local injuries of these situations are much more apt to be followed by the disease than those of any other parts of the body. The removal of small tumours about the head, or even the application of a few leeches to the temples, is not unfrequently followed by fatal erysipelas; whereas the same kind of injury inflicted on any other part would not give rise to the malady.

In all the instances in which we have had an opportunity of examining the seat of disease after death occasioned by erysipelas about the head, the skin was found very much thickened, and its texture to have become very soft; and the cellular membrane between it and the bone was converted into a substance exactly like yellow jelly. The dura mater, also, in every case, partook of the disease.

But erysipelas seldom confines itself altogether to its simple form, in any locality. The cellular membrane in contact with the skin, and, frequently, that portion of it also which is situated more deeply among the muscle, partakes of the disease. When this occurs, extensive sloughing generally takes place; openings are produced in the integuments, by partial sphacelus, through which the dead cellular membrane protrudes in masses, and is ultimately discharged, if the patient survive, leaving hollow spaces to a great extent between the integuments and the flesh. This variety of the malady is commonly called "phlegmonous erysipelas."

The foregoing description forms a sufficient illustration of the symptoms and morbid appearances of erysipelas to answer the purpose of this work. With respect to its *cause*, it is a mere matter of opinion or of speculation: our notion, with regard to that subject, may be gathered from the previous sections.

With reference, also, to the constitutional treatment of erysipelas, and of the other diseases of which we shall speak in this essay, it is proper to state at once, that little will be said here; because the object of the work is *not to present a full treatise* on these several affections, but to illustrate the *local effects* of a certain remedy in them. It is not pretended that the local remedy will supersede the necessity for general treatment, when constitutional symptoms demand such treatment. But, as the constitutional disturbance frequently depends upon, at any rate is aggravated by, the local disease, it will often be found that by reducing the latter, the former will also diminish, and, perhaps, altogether disappear, without the aid of any general means. This fact we have witnessed in very many instances. But the safer plan is not to neglect general treatment in affections insidious in their nature, and whose course is generally short, either towards restored health, or towards death.

As a general statement, then, respecting the constitutional treatment of inflammation, whether of the erysipelatous or of the phlegmonous kind, *except in very plethoric cases*, experience has taught us to be *cautious* in the abstraction of blood from the general system. By this expression, it is not meant to intimate that *no* blood should be drawn by venesection in any case: but even where its abstraction is fully authorised, it should be accomplished with moderation, and not in the reckless manner too often practised.

Having *well* cleansed out the alimentary canal, *without loss of time*, with eight or ten grains of calomel, followed by saline purgatives, our practice has been to administer calomel and opium, in doses according to circumstances, and repeated at intervals of from three to six hours, until the system has been brought *fairly*, but *slightly*, under the influence of the mercury; which is proved by a slight redness along the edges of the gums, or by the patient's feeling a slight looseness of the teeth. The remedy should be then immediately stopped.

So much for general treatment, which will apply to every variety of acute inflammation, differing, of course, in modification, according to various circumstances connected with each case.

But the object of the present essay, as stated before, is mainly to bring to the notice of the profession a local remedy whose curative properties, compared with those of other topical applications, are very little known at present.

The topical remedies commonly used in erysipelas are local bleeding by leeches; simple evaporating lotions, or lotions medicated with lead, zinc, acetate of ammonia, opium, camphor, or any other ingredients, according to the views or fancies of the practitioner; fomentations, generally of chamomile and poppy heads; poultices, simple or medicated; incisions through the seat of inflammation as recommended by Mr. Lawrence; scarifications as recommended by Dr. Dobson; the application of lunar caustic, as recommended by Mr. Higginbotham. Of the *modus operandi* of all these plans, we have already spoken, and the degree of reliance to be placed on each or all of them in erysipelas, is so well known as to render it unnecessary to treat of them specially here. But it will be found, upon trial, that the tincture of iodine is a topical remedy far more efficacious than any of them, or of all of them put together.

An elderly gentleman, who, in former years, had been a very active man, began to decline in general health about 1828, or the beginning of 1829. His bowels became irregular: his complexion appeared "bilious;" his mental faculties, which were naturally very strong, began to show a decline; and, in a word, the general functions of the system became all more or less disordered. He was repeatedly cupped and leeches on the nape of the neck and temples, and the parts generally showed a disposition to inflame, more especially when leeches had been applied. In the summer of 1830, after the application of several leeches to the forehead and temples, a severe

attack of erysipelas came on, which rapidly spread over the head and face, accompanied with a good deal of constitutional disturbance, such as quick pulse, furred tongue, and general uneasiness. The head was bald, having only a thin curtain of hair behind. *The tincture of iodine, reduced to half its strength, was applied by a camel's hair brush all over the head, temples, and face*; which, as may be supposed, gave him an odd appearance, from the brown or bronze colour it imparted to the skin. Next day the disease had all but disappeared. The local inflammation had very nearly ceased, and the symptoms of constitutional derangement had much abated. The tincture, however was applied once more, but still reduced in strength. No further trouble was found with the case.

The above was the first case of genuine erysipelas of the scalp in which the tincture of iodine was employed, and the effect was so striking as to encourage a repetition of the trial. From the unhealthy state of the patient, and from the rapidity with which the inflammation extended over the head, it was impossible not to entertain great apprehension as to the result. Under all the circumstances, the effect of the remedy proved most gratifying, both to the patient's friends and to the medical attendant.

In the autumn of the same year, a young man aged about 19 or 20, of a sickly bilious look, and subject to headach, especially after his meals, was seized with "spontaneous" erysipelas of the face. The inflammation commenced in one of his ears, and from thence spread over the temple, and ultimately over the whole scalp. When he applied for assistance, there were a few vesications about the ear and cheek: the head and face were considerably swollen, and very tender to the touch: and the whole scalp felt doughy and soft, and retained deep pits after being pressed with the finger. The general health was suffering much.—The hair was ordered to be cut off close to the skin, and the tincture of iodine, in its full strength, was applied all over the inflamed surface, which embraced the whole head, down to the neck. By the next day the swelling was very much abated, and the general symptoms were less severe. The tincture was again applied in its full strength. After the second application, the tincture, was reduced daily in strength, and used for two or three days longer. It is very probable that one or two applications would have sufficed to subdue the inflammation, but it was deemed prudent to repeat them daily for four or five days. The remedy was followed by a desquamation of the cuticle of the whole head; but the skin became quite clean and fresh in a few days. In this case, as well as in numerous others, the inflammation began to give way before the mercury, administered internally, could have affected the general system. Indeed, it was found unnecessary to press it so far as to affect the mouth, when the disease was fast disappearing without.

The remedy has since been frequently employed in cases of the above description—that is, erysipelas, of the head and face—both at the infirmary and in private practice, *with uniform good effect*. It

is unnecessary to recite more cases of this variety. Indeed, the few cases introduced in this work are merely intended to illustrate the mode of application of the remedy, and not to swell out or multiply its pages. If that were the intention, we could recite some scores. In consonance with our object, we shall state the two following cases; the first of which will come under the term "phlegmonous erysipelas," and the second will answer any term applicable to an anomalous swelling of a limb.

In February, 1830, a tradesman's wife, aged about 50 years, stout, but of an unhealthy appearance, had one of her legs very much inflamed all the way from the toes up to above the knee; it was swollen to at least double the size of the opposite limb. The inflammation arose from a slight scratch on the shin, and was of some days' standing, during which time cold lotions and fomentations had been applied to the part. The limb now presented a glossy, shining redness, from above the knee down to the toes; its size was as just stated; it pitted slightly on being hard pressed with the finger; there were several vesicles, containing transparent serum, on the back of the foot and lower part of the leg; the pain was excessively burning and acute, and the constitutional disturbance was very great. The tincture of iodine, of full strength, was applied all over the inflamed surface—that is, from the toes up to the middle of the thigh;—and the limb was directed to be kept in a horizontal position, and left exposed to the air. Next day the pain was nearly gone: the limb was considerably reduced in size; and the skin, especially about the knee and upper part of the leg, was shriveled into folds in consequence of the subsidence of the swelling. The fluid in the smaller vesicles had been absorbed, and the others were much smaller than the day before. No new vesicles had made their appearance. However, there was still considerable swelling of the lower part of the leg and foot, and the inflamed part still pitted on pressure, though not so much as on the previous day. The tincture was repeated, in its full strength. After the second application it was reduced in strength, and on some days rectified spirit alone was applied, merely with the view of redissolving the iodine which coloured the surface of the skin. The disease began to give way immediately after the first application of the remedy, and the limb rapidly recovered, leaving only a few small ulcers where the larger vesicles had been situated. These were treated in the usual way.

We have since met with several cases like the above, and have treated them in a similar manner, with equal success. Such cases are some of the worst that can present themselves, for, unless soon checked in their career, most extensive sloughing of the cellular membrane takes place; large and numerous openings form in the integuments, and the patients are almost sure to sink, either from the violence of the inflammation and of the constitutional disturbance caused by it, or else from the great discharge which follows so extensive a destruction of parts.

In cases of this description, it is generally beneficial to apply a bandage round the limb as soon as the inflammatory action has entirely subsided ; for this will serve to support the weakened vessels until their contractile properties shall have been recovered, and to promote the absorption of the morbid deposit.

A gentleman, aged about 60 years, rather stout, presented the following symptoms ; the right leg and foot were swollen to at least double the size of the left ; the swelling extended to above the knee ; the skin presented a glossy, shining appearance ; but its colour was rather pale ; or, at any rate, was hardly redder than natural : the limb pitted very considerably on pressure, and the integuments did not recover their level for some time after the removal of the pressure : there were several bullæ or vesicles about the ankle and the lower part of the leg—one was large and of a darkish colour : the general health did not suffer so much as might have been expected from the diseased condition of the limb, still the tongue was rather furred, and the pulse slightly quickened. The member was neither very hot nor very painful. Evaporating lotions had been employed for some days when the case presented itself, but the limb continued to swell more and more, and the vesicles went on increasing both in size and number. When it presented itself, the case was of four or five days' standing, but had become much aggravated within the last forty-eight hours.—The whole limb, from the middle of the thigh down to the tip of the toes, was painted with the tincture of iodine, in its full strength : it was ordered to be kept in an horizontal posture, and to be loosely covered over with a linen rag hose. At the end of twenty-four hours the member was decidedly smaller : the skin about the knee and upper part of the leg was loose, and drawn together in longitudinal folds, proving a diminution of the swelling : the smaller vesicles had dried up ; the larger ones had considerably diminished ; and the dark looking one had discharged itself. The application of the tincture was repeated, from the knee downwards to the toes. At the expiration of another day, the swelling was still more reduced : two or three of the larger bullæ had discharged themselves, leaving small superficial ulcers of quite a healthy appearance. After this time the leg was touched three or four times more with the tincture, reduced to about half its strength, and the two or three ulcerated spots were dressed with Turner's cerate. At the end of a week, there being some degree of œdema of the leg, a bandage was applied, and recommended to be worn until the vessels and the skin should recover their natural tone.

PHLEGMON.

The characters of phlegmonous inflammation are so well known to the profession as scarcely to require a description of them here. The disease generally commences with pain and a sensation of throbbing in the part, before any redness is apparent. The reason

of this is, that the seat of disease is entirely under the integuments, in the cellular membrane; and the malady makes considerable progress before the inflammatory appearance presents itself on the surface of the skin. The order of attack in phlegmon is the reverse of that in erysipelas; for, in the latter, the skin forms the original seat of disease, and the parts underneath become affected by contiguity, or rather by *continuity of vessels*.

There is another fact worthy of notice which distinguishes the two maladies, namely, that the extent of the destruction of the cellular membrane in erysipelas depends upon the extent of the inflammation of the skin; whereas, in pure phlegmon, the extent of cutaneous redness is determined by that of the inflammation of the cellular tissue underneath. When the skin constitutes the seat of disease the inflammation spreads rapidly and widely, by continuity of tissue; and as it dips down into the cellular membrane by continuity of vessels, thereby giving rise to the variety called "phlegmonous erysipelas," the latter membrane necessarily becomes very extensively affected. In phlegmon, on the contrary, the agency of the morbid cause is exerted on the cellular tissue—a tissue not prone to stretch out its maladies far—and the skin, being only secondarily affected, presents only a limited extent of inflammation, corresponding to the extent of disease underneath.

In pure phlegmon the cellular tissue shows the same disposition to die, or to resolve itself into purulent matter, as in phlegmonous erysipelas; only that in the former variety of inflammation the cellular membrane determines the extent of its own affection, by circumscribing it within the limits of an abscess. The destruction of the tissue is generally limited, and a boundary is soon formed between the healthy and diseased parts. With regard to phlegmon, indeed, we may say that its invariable tendency is to end in an abscess, unless the vessels recover their normal tone by the efforts of nature, so as to induce the inflammation to terminate in resolution; or unless it be checked by the interposition of art; for we doubt whether this variety of the disease ever ends in absolute gangrene, properly so called. It is true that it may, and does, cause the death of the part immediately affected, so as to occasion sloughing of the cellular membrane; but such sloughing is always of limited extent, and is not attended by the dark discoloration of the living parts, especially of the skin, and by cutaneous vesication, which characterise gangrene.

The redness in phlegmon is not so florid as that which the skin presents in erysipelas, and does not so entirely disappear on pressure. This is accounted for by the fact, that in simple erysipelas the vessels which are enlarged are those of the skin only, so that the pressure of the finger puts a stop to the circulation through them for a moment, and leaves the point pressed upon free from blood; whereas in phlegmon the vessels chiefly enlarged are more deep-seated, so that, although pressure on the surface may obstruct the circulation through the capillaries of the skin, still the redness

will show itself from the vessels situated beneath the integuments.

It has been already stated that a throbbing pain usually precedes the redness and swelling in phlegmon, because the tissue originally affected is beyond the reach of sight. Increased heat, also, generally precedes the visible phenomena of the disease. Sometimes, indeed, when the part affected is situated very deeply—that is, when the inflammation is in a part of the cellular membrane situated low between the muscles—a portion of the tissue is destroyed, and an abscess is formed, before any external signs of inflammation show themselves. The integuments do not begin to inflame until the matter has worked its way some distance towards the surface, so as to discharge itself through the skin.

The topical remedies usually employed in phlegmonous inflammation, are leeches, and evaporating lotions: and, occasionally, poultices and fomentations. These are medicated with anodynes when the pain is very severe. Scarification of the inflamed part is sometimes resorted to; also the formation of an eschar over the part with nitrate of silver. These means are all good in their way, and are the most efficient—indeed the only ones—which have been used hitherto. But the inflammation will be subdued by the tincture of iodine much more quickly, and with greater certainty, than with any or all of these means.

In what manner the influence of the tincture reaches the vessels, in deep-seated inflammation of the cellular membranes, we do not profess to be able to explain, but that the remedy *does* exert an influence upon them is perfectly certain. In cases where pain and throbbing only exist, and where the inflammation has not yet made its appearance on the skin, it will generally be found that a single application of the tincture, in its full strength, and thickly painted over the seat where the pain is felt, will at once check or cut short the disease. A sensation of warmth, and probably some degree of smarting, will be felt in a few minutes in the part to which the remedy has been applied: this may continue for an hour or two; and when it ceases, the original pain also will generally be found to have ceased. However, it is safer to repeat the application, though no more pain or throbbing be felt; for no harm can arise from so doing. We feel satisfied that in many instances where suppuration had commenced, repeated applications of the tincture has not only checked the progress of the inflammation, but has also caused the matter already formed to be absorbed.

Nevertheless, when the seat of disease is *very* deep among the muscles, especially in the thigh, or about the loins, it is doubtful whether any impression would be made upon the inflammation by the local application of the remedy: we say it is doubtful, because we possess no facts either affirmative or negative of the proposition. Affections of that description are often very obscure in the first part of their course, and they frequently form abscesses before their real character is discovered. However, from our experience of the pro-

perties of the tincture of iodine in promoting absorption of morbid deposit, we would trust to its employment in cases of this nature in preference to any other topical application.

When the inflammation takes place nearer the surface—that is, in the cellular membrane which intervenes between the integuments and the muscles—the redness very soon appears externally, and the disease presents from the beginning those characters which are distinctive of genuine phlegmon. Such cases are to be treated in the same manner as phlegmonous erysipelas. The tincture is to be applied the first time in its full strength. After the first application, the inflammation will be generally found, at the expiration of twenty-four hours, nearly subdued. The skin, which was before tense, will appear loose and wrinkled, and the cuticle beginning to peel off. If there should be no matter formed underneath, the remedy may be diluted to half its strength for the second application; but if pus exists under the integuments, it is desirable to let the tincture remain of its full strength, and its application be repeated daily, until the matter shall have been all absorbed, or else until it shall have worked its way to the surface, and discharged itself, or been let out, through the skin.

A robust, healthy looking young woman, about 20 years old, applied in March, 1834, with phlegmonous inflammation of the right leg. The disease commenced about the middle of the leg, on the outside, over the fibula. The skin was now inflamed over a great part of the leg: it was of a deep red colour, very tense, and very hot to the feel. The limb was a good deal swollen, but no matter appeared to be formed. The pain was very severe, accompanied by a throbbing sensation. The pulse was quick; the tongue whitish; thirst, and other febrile symptoms. The inflammation was “spontaneous,” and of four days’ standing. It had been treated with Goulard lotions, which rapidly dried when applied to the part, but which neither alleviated the pain nor appeared to reduce the temperature beyond a minute or two after each fresh application. The tincture in full strength, was applied all over the leg, from the knee down to the instep, and the limb was ordered to be kept in a horizontal posture. No general treatment was had recourse to. A few hours after the application, the sensation of pain and throbbing almost altogether ceased. Next day the swelling had considerably abated; and scarcely any more signs of the disease remained than a feeling of stiffness in the leg, and a slight soreness on pressure. The tincture, diluted to about half its strength, was again applied, and the limb was allowed to rest for two or three days; which completed the treatment of the case.

We could recite at least a score of cases analogous to the above; but one is as good as a hundred in illustration of a principle. It is possible that the remedy may fail in some instances, but, if properly and prudently applied, cases of failure will be very rare; by failure, we mean where the inflammation runs on and forms an abscess in spite of the remedy. We have not yet met with such a

case—that is, a case of superficial phlegmon where the tincture was applied before matter had begun to form: such a case of failure has not occurred to us.

In May, 1838, a strong, healthy man, about 35 years old, had a thorn run into the outside of his thigh, about midway between the hip and knee, in passing through a thick hedge. He took no particular notice of the accident at the time. The part, however, continued painful; and three days after, it began to swell a little, and to inflame. He kept poulticing it for three or four days longer, but the inflammation went on, rapidly increasing in violence, and extending over a great part of the outside of the thigh. The limb was now very red, hot, and painful; much swelled; hard to the feel, and leaving no pit, but a momentary paleness, upon pressure with the finger. The heat and pain were excessive: the latter was of a throbbing nature, corresponding with the contractions of the ventricles of the heart. There was a considerable degree of general fever. It was doubtful in this case whether suppuration had not commenced, for something like an obscure fluctuation could be distinguished at the point where the thorn had entered.—The whole thigh was painted over with the strong tincture, all the way from the hip and groin down to the knee. After getting dry—which it did in two or three minutes—the application was repeated three or four times to the outside of the limb, especially over the part which had suffered the accident. Ten grains of calomel, followed by a saline cathartic, were ordered to be taken immediately. About a quarter of an hour after the application, the limb began to feel very warm—a warmth congenial to the feeling compared with the heat and pain experienced before. This warmth was soon succeeded by rather a severe smarting, which continued for three or four hours. When the smarting ceased, the original pain, also, for the most part, was gone. The next day after the application of the tincture, the outskirts of the inflammation had all disappeared, leaving the skin wrinkled, and the cuticle beginning to desquamate. There still remained a hardness, and soreness on pressure, with a certain degree of swelling, extending a few inches round the point where the injury had been received; but the throbbing pain had entirely left. The undiluted tincture was again applied to the hard part, and carried some distance beyond the hardness. The application was repeated daily for four days, which served to complete the cure.

In cases similar to the last, but where suppuration has gone on to some extent, the iodine may not succeed in producing an absorption of all the purulent matter deposited; but it will exert an extraordinary power of confining the suppuration within narrow bounds. It almost immediately stops the inflammatory process, so that no more destruction of the cellular membrane takes place, and the line of boundary between the dead and living parts of the tissue affected is soon determined. In such cases, when an abscess does form, instead of having a cavity containing several ounces of pus

—as we generally find to be the case where the treatment has been by poultices, &c.—perhaps not an ounce will escape when the abscess breaks, or is opened.

EXTENSIVE SLOUGHING OF THE CELLULAR MEMBRANE.

Severe cases of phlegmonous erysipelas, especially of the lower extremities, are frequently followed by very extensive sloughing of the cellular membrane, which protrudes through ulcerated openings in the skin, leaving large vacancies between the integuments and the muscles. While this mischief is going on in one part, the inflammation often continues to spread progressively, so as, now and then, to involve a whole limb. If the patient does not die under the violence of the disease, in these cases, he generally soon sinks under the enormous purulent discharge which takes place as its consequence.

In cases of this description, almost the only topical remedies in use are large poultices and fomentations. It is a question whether these be not more injurious than beneficial, for by increasing the discharge, without being capable of checking the inflammatory process, they must tend to diminish the little strength which remains with the patient.

Under these circumstances, the tincture of iodine is a most valuable acquisition as a remedy in these grievous affections. It not only has the advantage of being easily applied, without disturbing the posture of the patient, but it also has the property of at once arresting the progress of the inflammation, so as to give the living parts a chance of casting off the dead slough.

In the summer of 1837, a man, aged 75 years, received a kick on the shin. The part became inflamed, and the inflammation proceeded from bad to worse, in spite of surgical treatment under the management of a skilful practitioner, until the whole leg and thigh became involved in one mass of disease. When we saw him in consultation, the limb, all the way from the toes to the groin and hip, was enormously enlarged. The skin was intensely red and glossy, with the exception of several dark coloured vesicles about the lower part of the leg. In different parts of the limb there were several ulcerated openings in the integuments, through which strings of dead cellular membrane protruded. The discharge through these openings was very great. Indeed, it appeared as if the integuments of the whole member had separated from the muscles, leaving an empty space between. The constitutional disturbance was as great as it could well be consistent with life. In a word, the patient, considering his great age, and the extensive destruction of parts, appeared quite in a hopeless state. The tincture of iodine, of full strength, was thickly painted over the whole limb—thigh, leg, and foot; and the application was repeated daily. At the expiration of twenty-four hours there was some slight amendment: on the third day the amendment was very decided. The

march of the inflammation had been checked : no more bullæ had formed, and most of those which existed before, had discharged themselves, leaving small, healthy looking ulcers on their site. The only doubt now was as to the strength of the patient to bear the enormous discharge that must take place from the excavations which ran in all directions between the integuments and the muscles of the leg and thigh. After the first four or five days, the tincture was applied every second or third day, until all the dead membrane was thrown off; and as soon as that object had been accomplished, it was still applied occasionally to any spot which showed a disposition to inflame. As soon as the sloughing had ceased, the openings in the integuments were dressed with simple dressing, and gentle pressure was applied to the limb, with the view of promoting adhesion between the parietes of the excavations. By proceeding upon this plan, the recovery of the patient was ultimately secured.

July 15th, 1833, a thin, but healthy man, aged about 58 years, was felling a tree. The tree bounded over, and the stem fell upon his foot, lacerated the soft parts over the ankle and all along the back of the foot, exposing very extensively the extensor tendons of the digits. Independently of the extensive laceration, the foot and ankle suffered very severe contusion from the weight of the tree. There was also a fracture of both bones of the leg, about three inches above the ankle. The fractured bones having been set, and the lacerated parts having been brought together as well as could be done under the circumstances, and retained so with adhesive plaster, an evaporating lotion was ordered to be kept constantly applied to the foot and ankle. The lotion was continued for three days. The limb did not swell much, nor did there appear to be any considerable increase of its temperature, although the weather was hot; but on removing the dressing, on the 18th, the integuments and wound presented a dark, livid, sloughing appearance, and the whole foot looked as if gangrene must necessarily take place. There was also present that peculiar constitutional disturbance which usually attends gangrenous affection of any part. The tincture of iodine was immediately applied over the foot and ankle—the parts were coated over three or four times with it. The internal treatment consisted simply of common saline solution, with a small quantity of sulphate of magnesia. By the next day the foot presented a much more favourable appearance. It was quite evident that the gangrenous tendency had ceased. The greater portion of the integuments, whose life was supposed to have been entirely gone, showed indications of vitality. Those parts which had actually lost their vitality began already to exhibit a disposition to separate from the living part. The tincture was repeated daily for three or four days, until the vital part cleared itself of all the slough; which it did most rapidly: the remedy, a good deal diluted, was then applied every two or three days to the surface and round the edges of the ulcer, in order to quicken the growth of granula-

tions. Suffice it to say that the ulcer healed very rapidly, and that the patient was restored to his occupation, free from lameness, quite as soon as if there had been only a simple fracture of the leg.

We must be pardoned for again repeating the observation, that these are not casual, solitary instances of this description of disease where the tincture of iodine has proved beneficial: it is almost uniformly successful, so far as our experience tends to prove: the exceptions are cases where some extraordinary gangrenous disposition exists in the system—as we now and then find when amputation of a limb is performed before the dead parts have separated, and where gangrene immediately commences in the stump; or where the sloughing has already extended so far that the system does not retain sufficient strength to restore the lost parts.

ACUTE INFLAMMATION OF THE JOINTS.

Inflammation of the synovial membrane of the joints—especially of the larger joints—requires very prompt treatment, otherwise permanent organic changes take place, so that the free motion cannot be restored. The pain is generally severe in acute inflammation of this tissue; and the tenderness is often so great that the patient cannot bear the part to be touched. The soft parts covering the joint become swollen, and the inflammation presents itself externally on the skin. The joints by far the most liable to this kind of affection are the knee and hip; and as the tissue originally affected is endowed with but a small degree of sensibility, the disease frequently makes considerable progress before any particular notice is taken of it. This is proved by the fact, that a slight uneasiness, or a small degree of tenderness, often exists in the joint for several days, or perhaps a week or more, before the patient is laid up; and that, when the disease has once arrived at a certain stage in its progress, it runs on very rapidly, so as to produce suppuration within the capsule of the joint, unless promptly met by remedies.

The topical remedies usually employed in this affection, are local abstraction of blood, either by cupping or leeching, or both; evaporating lotions; poultices, warm or cold, according to the views of the practitioner; and, occasionally, fomentations.

Now, the tincture of iodine has been employed very extensively, both at the General Infirmary and in private practice, in this disease, and has been found a much more efficacious remedy than any of those in common use. It is necessary, however, to state, that no disease for which the iodine has been employed requires so much discretion on the part of the surgeon as the one under consideration. If used too strong at first, or applied too frequently, it may give rise to inflammation of the integuments, and cause, or add to the puffiness of the soft parts external to the joint; but we have not known it in any one instance to aggravate the internal inflammation. We speak now more particularly of the knee joint. The texture of the patient's skin must serve to guide the practitioner, in

a great measure, respecting the strength of the tincture and the frequency of its application. It should be at first diluted to about half its strength, or more, if the skin be of a very delicate texture; and, if required, its strength may be gradually increased according to its effects. It is seldom that the remedy produces any irritation of the skin in other parts of the body; and with regard to the knee, our remarks are intended more to put the practitioner upon his guard against what *may* happen, than to inform him of what *will* happen. Should any irritation or inflammation of the integuments occur, it will be very readily subdued by a simple evaporating lotion, composed of one part of spirit of wine to eight or ten of water.

The tincture, diluted, may be applied at once all over the inflamed joint, with perfect confidence that not only no *mischief*, but that *good*, will be the result. But when the disease has been pretty far advanced, and where the swelling has been considerable, we have generally preferred leeching the joint first, and then, a few hours after the bleeding has ceased, to apply the tincture. Whether by getting into the leech bites the remedy exerts a greater influence on the internal vessels of the joint, we do not profess to know, but the fact is that the application of leeches, in this species of inflammation, previous to the employment of the tincture, tends greatly to assist the good effects of the latter. The remedy will generally require to be applied every day, for two or three times; then every other, or every third day, according to circumstances; the practitioner exercising his discretion according to the condition of the part, and the effect of each application. If, in the intermediate time of the applications, the part should acquire an increase of temperature—as it sometimes does very suddenly, without any evident cause—it will be useful to lay over it a layer of rag soaked in spirit of wine, or in a simple spirit and water lotion. This application will not interfere with the repetition of the iodine. But no lead or zinc lotion, or one medicated in any way, should be employed.

When the hip is the joint affected, leeches should be applied to the groin and behind the great trochanter; and after the bleeding has ceased, the whole of the upper part of the thigh, the hip, and the groin should be well painted over with the tincture, of its full strength. The application, as in all other cases, should be repeated according to circumstances.

Having illustrated the principle and mode of application of the remedy, it is unnecessary to occupy the time of the reader by a detail of cases of this species of inflammation, for the doing so would be only a repetition of the same mode and principle already just stated. It is also assumed, as a matter of course, that, in this disease, as well as in all other local affections, no general treatment calculated to assist in the subduction of the local malady has been neglected.

INFLAMMATION OF THE BREAST.

The inflammation of the breast which so frequently takes place soon after delivery is of the pure phlegmonous kind, having its origin and seat in the cellular membrane pervading the mammary glands. Its commencement and progress are attended with heat and throbbing pain, and it terminates, if not in resolution, in a purulent abscess, like that proceeding from common phlegmon. The collection of matter is generally very great, attended with a good deal of constitutional disturbance, and the abscess usually opens by a large hole, denoting much sloughing of the integuments and of the cellular membrane within.

In three cases out of four, or even in a larger proportion, acute inflammation of the mammæ runs on to suppuration under the usual plans of treatment, and the abscess is generally upon so large a scale that the gland never afterwards recovers its natural function. The topical remedies in common use are leeches, lotions, and poultices. The popular remedies are of a more stimulating kind, and are applied in the form of embrocations, which, it cannot be denied, are oftener followed by success than the professional ones.

Although generally very deeply situated among the glands, inflammation of the breast is not beyond the reach of the influence of the iodine. If applied before matter has actually commenced to form, the tincture will prove successful in the great majority of cases. When suppuration has already commenced, the application will materially confine the mischief, probably by subduing the inflammation surrounding the abscess; and instead of having an enormous discharge of matter, from a cavity occupying nearly the whole of the breast, perhaps not more than an ounce or an ounce and a half will come away on the breaking of the abscess.

As soon as it is discovered that inflammation has commenced, the tincture, in full strength, should be applied extensively over the part affected. When the disease originates very deeply among the mammary glands, the remedy should be made to cover the whole breast. The application should be repeated next day, equally strong, unless the smarting from the first should have been severe: if so, then the tincture ought to be diluted. At any rate, the breast should be painted over with it daily, until the pain and redness shall have ceased, the strength being regulated according to its effect on the skin. Even if suppuration is known to be going on, it is still expedient to pursue the same course, because the remedy will tend greatly to limit the extent of the abscess, and will accelerate its bursting. When the abscess has burst, or has been opened, a poultice should be applied to the part, and continued as long as any discharge exists; but an occasional application of the tincture, even after the bursting, will be found to aid the cure very materially.

Three cases of this description have been under treatment within the last six months ; and, during the last five years, several cases have occurred, in some of which suppuration took place, but always small in quantity. In the great majority the inflammation was checked before any purulent matter was formed, or when it was so small in quantity as to be again absorbed under the use of the remedy.

GOUT.

The inflammation of gout is universally considered as dependent upon constitutional causes. No doubt, the morbid cause of the disease is conveyed to the local seat of affection through the medium of the system, and the functions of other parts suffer from it besides those which present themselves externally. But the most unbearable symptom of the disease is the *pain* in the local seat of inflammation ; and the violence of this is generally such as greatly to aggravate any constitutional symptoms that may exist. Previous to the appearance of the local inflammation, there is generally an uneasiness about the pit of the stomach ; nausea ; general languor, attended with a disposition to irritability, both of mind and body ; darting or shooting pains in different parts of the body, &c. When the local pain comes on, the foregoing symptoms become drowned in a general fever, which continues, more or less, as long as the local affection exists.

The local remedies usually employed for the removal of the pain and inflammation of gout, may be divided into two classes : first, professional ; second, popular. The former are the same as those used in other local inflammations, namely, leeches, evaporating lotions, fomentations, poultices, &c. The latter consist in the application of hot flannels, and other hot things ; stimulating embrocations ; stimulating plasters, &c. The object of the first class is to *prevent* inflammation from taking place, by means of antiphlogistic remedies : the object of the second class is to *promote* inflammation and swelling, because experience has proved that as the integuments swell and inflame, the pain diminishes. The virtues, and want of virtues, of both classes of remedies are so well known to the profession, and to those who are subject to the disease, as to render any remarks upon them here unnecessary.

The curative effects of the tincture of iodine in the pain and inflammation of gout can be appreciated by those only who have witnessed them, or those who have received the benefit of the remedy. We have generally found one or two applications remove the pain almost entirely. We usually dilute the tincture to about two-thirds its full strength ; and if the part affected be the foot, we paint it and the toes well over, all the way from the ankle ; or from higher up the leg if the ankle itself suffers from the disease. The application is repeated next day if any pain, redness, or swelling remains. In fact the disease is treated like common phlegmonous

inflammation. When the malady has fixed itself in the fingers and hand, the treatment is the same: the whole hand, fingers, and wrist are brushed over, and the application is repeated as long as any trace of the disease remains.

A gentleman of our acquaintance (who has never had a regular attack of gout, but has had many threatenings of it,) whenever he experiences pain in the ball of his great toe, with tenderness on moving the joint, immediately applies the tincture very liberally to the seat of threatened mischief. By so doing he has hitherto warded off the attacks; and the constitutional derangements accompanying these threats have been rectified by simple saline aperients.

A gentleman, aged about 50, who had, usually, for many years been obliged to lay up for several weeks each year with the gout under the old established mode of treatment, has had, of late years, the paroxysms reduced to a few days only. The local affection has been always preceded by a good deal of gastric derangement, and the pain in the feet, at the commencement of each attack, has been excessive. The pain, however, has been relieved in a few hours by the application of the tincture; and even the redness and swelling (when the disease has been allowed to proceed so far) have been soon reduced; and, aided by general treatment, every paroxysm has been of late years subdued in a few days.

A man, aged about 45, of stout make, but of rather unhealthy constitution, has been much subject to gout of late years. The pain in the feet, as the paroxysms come on, is excessive. Before we began to attend him, the feet used to inflame, and swell considerably, so as to confine him for weeks. Within the last few years, the application of the tincture to the feet, and a few doses of colchicum internally, have set him up in a few days. The pain has been usually subdued in a few hours.

In very many cases of anomalous pains of the joints, supposed to be gouty or rheumatic, unattended by inflammation, the effect of the tincture of iodine has been very noted. In such cases it ought generally to be used in full strength, unless the texture of the skin be delicate. It first causes a sensation of warmth, amounting in most instances to smarting; and it commonly follows that when that sensation has ceased, the original pain is no longer felt; or, if felt, it is in a much lower degree than before the application of the tincture.

CHRONIC INFLAMMATION AND ENLARGEMENT OF THE JOINTS.

This affection constitutes generally a large proportion of the surgical cases admitted into hospitals. The disease varies in degree from that state commonly called "white swelling," down to a slight thickening of the soft part, and tenderness on moving the joint. Its cause may also vary: sometimes it is connected with a scrofulous state of the system; at other times it is produced by some slight

accident to the joint ; whereas it often comes on without any accountable cause.

When the large joints, such as the hip and knee, have formed the seats of affection, the treatment has usually been local bleeding, followed by blisters or setons. In fact, all the remedies commonly employed in acute inflammation, with the addition of stimulating embrocations, plasters, and mercurial inunctions have been at different times put in practice in this obstinate malady.

Iodine, also, has been employed in enlargement of the joints, especially in cases accompanied by a scrofulous condition of the system, from the supposition that the remedy possesses some specific influence over that disease. We have never had reason to believe that it does possess any such influence, any further than that, as a topical remedy, it will subdue scrofulous inflammation in the same way as it subdues any other local inflammation. The iodine has been generally employed in these cases in the form of ointment. It is not only objectionable in that form on account of the friction tending to increase the pain and irritation of the joint, but also because its effects are nothing like so beneficial as when applied in the form of tincture, or of iodureted hydriodate lotion.

To the large joints, such as the hip and knee, we generally apply several leeches before the employment of the iodine. Having done so, the tincture, usually diluted, is applied very extensively over the affected joint, and repeated every two or three days, according to its effect on the skin. Should any preternatural heat occur in the part, a layer of rag, soaked in spirit of wine, or in a simple spirit lotion, should be laid on it, the same as directed to be done in the acute form of the disease.

This plan is to be persevered in for a period limited only by the duration of the disease. An amendment will generally be found in a few days to have taken place ; and it will go on progressively, but in many instances slowly, until the motion of the joint is restored, as far as art can restore it.

When the enlargement has been in the ankles, or wrists, and of long standing, we have generally preferred the iodine lotion, even to the tincture. This is the most ready form of the remedy in cases like those of out-patients at hospitals, where the practitioner has not an opportunity of frequently witnessing the progress of the cure. The strength of the lotion must be determined by the discretion of the surgeon. A piece of rag should be soaked in it, and laid round the affected joint, and the application should be repeated two, three, or four times a day, according to its effect on the skin.

This plan of treatment has received a long and extensive trial, and it has succeeded very far beyond the methods usually adopted in affections of this nature.

INFLAMMATION OF THE ABSORBENTS.

The first, and worst, case of inflamed absorbents in which the

tincture of iodine was used, was that of a gipsy-man, aged about 30, in 1829, who had been bitten on one of his fingers by a horse. Some purulent matter from an abscess in another horse got into the wound. The part soon inflamed, and the inflammation rapidly extended along the course of the absorbents up to the axilla. When we saw him the disease was of a fortnight's standing. There was an abscess discharging at the bend of the arm; another about the middle of the upper arm, and a third in the axilla; and there was a wide path of inflammation traceable all the way from the wound to the axilla, along the course of the absorbents. The man was reduced to a mere skeleton.

The tincture of iodine, of full strength, was freely applied along the inflammatory path, and over the abscesses; and the application was repeated daily. Common dressing was then applied to the abscesses. The inflammation, by this plan, was subdued in two or three days, and the patient was well in a fortnight.

We might detail a dozen or more cases of inflamed absorbents, from slight injuries to the toes or fingers; from the pressure of the shoes upon corns; from the too close cutting of corns, and from other causes, where the tincture has been applied, and uniformly with success. Indeed, one or two applications generally suffice to subdue the inflammation of the absorbents; but we have usually continued daily to touch the original source of the mischief—that is, the wound, or corn, or bunion, or whatever the cause may have been—for some days after the inflammation has disappeared.

CARBUNCLE.

In November, 1836, a man whose constitution has been already noticed, as being subject to gout, had a regular and well formed carbuncle on the back of the neck. He allowed the disease to go on—applying poultices, &c. in the mean time—for ten days, before he applied for surgical aid. When we saw him there was a large carbuncle in the middle of the nape, having a great number of small openings on the surface, and being surrounded by a hard, dense, red swelling. The skin was quite tough and leathery. The general health was suffering very much.

The usual practice in these cases is to make a crucial incision in the carbuncle, and then continue the application of poultices until the part is restored to its normal state, or until the patient dies; doing all necessary things towards improving the general health.

The tincture of iodine, of full strength, was applied very thickly over the inflamed surface, as well as over the carbuncle. On the next day the inflammation was found considerably diminished. The application was repeated as before. On the third day the inflammation was nearly gone. The skin corrugated, and the cuticle was desquamating all round the carbuncle: but the carbuncle itself remained much in the same state, having a great number of small openings on its surface, through which the matter within

could find no free exit. As there evidently was a considerable quantity of dead cellular membrane which must be discharged before the abscess could get well, a single transverse incision was made through the carbuncle. The tincture was then repeated daily, and having allowed an hour to elapse after its application, a small poultice was put on, for the purpose of keeping the abscess moist. The dead cellular membrane was cast off in three or four days, and the cavity left by it filled up rapidly by granulations.

Last winter, a labourer, aged about 40 years, of a thin, irritable, unhealthy look, applied for relief for a boil (as he called it) on his back. He represented it as having been coming on for a fortnight, during the whole of which time he had poulticed it. He found that his health was fast giving way, and that the boil was daily getting larger and more painful, he therefore presented himself for surgical aid.

On examining the back, there was found on the left loin a large carbuncle, having a number of very small openings on its surface, and being surrounded to a considerable extent by an areola of inflammation. The part was swelled, and felt as hard as a board. The skin was of a dark red colour, and communicated a tough, leathery feel to the fingers. The health had suffered considerably within the last week.

There was also an incipient boil on the left shoulder, just over the blade bone, having precisely the same characters as the one on the loin at its commencement. Two applications of the tincture served entirely to dispel this young carbuncle.

A crucial incision was made in the carbuncle on the loin, and then the tincture, of full strength, was thickly laid on it, as well as on the extensive areola of inflammation surrounding it. A small poultice was applied to the abscess, with the view of keeping it moist. The only general treatment was a tea-spoonful of Epsom salts every morning, in half a pint of water. Next day the inflammation had considerably subsided, and the leathery hardness of the skin surrounding the carbuncle was very nearly gone. The man felt already much improved in health: he had had a good night's sleep, which he had not before enjoyed since the local disease had made its appearance. The tincture was again applied, both to the carbuncle and to the surrounding skin. After the second day it was not found necessary to paint the skin, for no inflammatory action any longer existed. The carbuncle, however, was touched daily for some time, in order to enable it the sooner to cast off the dead cellular membrane, and to form granulations. In a few days the slough was discharged, leaving a very large, deep cavity, which, however, filled up very rapidly under the occasional application of the tincture, diluted to about a third of its full strength. The man was fit for work in less than a fortnight from his first applying for surgical aid.

It may be stated here, that the remedy is equally applicable to common boils. It has also been used in several cases of bubo—

some dependent upon chancre; others upon gonorrhœal irritation—and its good effects have been uniform. If applied to them in their incipient state, before suppuration has actually commenced, it will *generally* cut short their march. If applied after the commencement of suppuration, and previous to their bursting, it will subdue the surrounding inflammation, and confine the abscess within a very narrow space. If applied after the bursting, it will materially accelerate the removal of the hardness and inflammation surrounding the cavity of the abscess. These are real facts—facts easily tested by trial.

LUPUS, OR NOLI ME TANGERE.

This is a disease kept up apparently by some specific cause, which induces it to go on progressively, destroying in its march the integuments and parts situated underneath. It usually commences on one of the alæ of the nose, or side of the cheek close to the nose; or else on the lips, especially the lower one. It generally begins in a pimple or small tubercle, which ulcerates, and the ulceration spreads in a continuous manner, eating up in its course the skin, alæ of the nose, or other parts beneath, to a considerable depth.

The principal remedy employed for this destructive malady is arsenic, both administered internally, and applied externally, so as to cause sloughing of the diseased part. Nitrate of silver has been also used with the same view. Ointments made with different preparations of mercury, as well as pitch and sulphur ointment, have all been applied in their turn.

September 10th, 1829, a respectable mechanic, aged about 36, had an eating ulcer on the left ala of the nose, extending some distance on the side of the cheek. The disease had crept up the nose as high as the nasal bone, and had eaten right through the cartilage, so as to produce a slit into the nostril. It was creeping on fast along the side of the cheek. The part was excessively painful. The disease was of some weeks' standing. Various applications had been tried before we saw him, and he had consulted some noted London surgeon; but the malady was steadily progressing in its march.—The tincture of iodine, of full strength, was applied over the surface of the ulcer, and to some distance round; and the ulcer was then dressed with ointment containing hydriodate of potass. The disease made no further progress. In a few days an amendment was quite perceptible. The ulcer was treated in the same manner daily until the 30th: after that period the tincture was only applied every two or three days. On the 20th of October the patient was discharged, cured.

In the same year, a labourer, aged about 40, had an eating ulcer on the side of the left cheek, near the nose. It had consumed the integuments to the extent of a crown piece; but in the middle of the part destroyed there was a kind of rough skin forming, which was situated below the level of the old integuments. Between this

and the outward edge of the disease there was an ulcerated space exceedingly painful. The tincture of iodine was applied daily over the ulcer and surrounding skin: no further dressing was employed; the part being left exposed. No internal remedies were used. The malady ceased to spread after the first application. In three weeks the case was discharged, cured.

The remedy has proved equally successful in two or three cases of the same disease affecting the lips, in its incipient stage.

It is proper, however, to state that the remedy failed in one instance at the infirmary, although assisted by the internal use of the arsenical solution. This was the case of a little girl, about twelve years old, whose nose, and the side of whose face, were affected by the disease. In this case, whenever the iodine was employed, the march of destruction soon stopped, and the parts invariably put on a more healthy appearance; but whenever any other application was used the affection increased.

MALIGNANT ULCERS OF THE TONGUE AND TONSILS.

Ulcers of a very troublesome kind often form within the cavity of the mouth. These are occasionally tainted with syphilis, especially when they attack the tonsils, and velum of the palate. Frequently, however, even these parts become the seats of destructive ulcerations, in the production of which syphilis has had no share. We were greatly puzzled respecting the treatment of affections of these seats before we began to employ the iodine; but since then the treatment has been easy enough, and almost uniform in its success—indeed, we may say quite uniform as far as our experience goes.

September 7th, 1829, a youth, aged 16 years, had the left tonsil very nearly all destroyed by ulceration, which was still proceeding. There was also ulceration going on in the uvula and back edge of the velum. The right tonsil was considerably swollen, and the whole of the soft palate was much inflamed. The tonsil began to ulcerate three weeks previous, and the disease was going progressively on, destroying the soft parts in its course. His general health was suffering a good deal. He had been under medical treatment since the throat first became bad. He denied having given occasion for any syphilitic affection. The tincture of iodine was applied with the brush all over the palate, tonsils, and uvula; and the application was repeated daily. The only internal remedy was the iodureted hydriodate solution, in doses of ten drops twice a day, in water. We find, by our notes, that the patient was dismissed, cured, on the 20th of the same month.

A butcher, aged about 35, healthy looking, though not very stout, applied, November 30th, 1829, for relief to an affection of the tongue. The disease had been coming on for some months, and he had been under treatment for it without finding any benefit. The tongue was altogether a good deal enlarged, and several parts of it were indurated deeply into the substance of the organ. The

surface of the indurated points was ulcerated. The ulcers were, each, small in extent; but they were very numerous, and extremely painful at times, and very tender when they came in contact with the teeth, or the roof of the mouth.—The tincture of iodine, of full strength, was applied all over the tongue, and the organ was directed to be allowed to hang out of the mouth for two or three minutes after every application. The only internal remedy was the iodurated hydriodate solution. After the 5th of December, thinking that the tongue was well, the patient ceased to attend. Finding, however, that the disease threatened to return, he applied again on the 21st of January following (1830.) The same treatment was resumed and continued for a week only, when he found himself well, and left off coming. He has had no return of the disease since.

These cases are selected because they are among the first of the kind that were treated with the tincture of iodine. Many similar ones, and various other affections of the mouth have been since treated in the same way, with equal success.

SCROFULOUS SWELLING OF THE GLANDS.

In scrofulous constitutions, the hereditary malady generally shows itself externally in the lymphatic glands under the jaw and about the neck. Why it should bear a more intimate relation with the glands of these parts than with those of other seats, is one of those mysteries connected with the living structure which have not yet been fathomed. The commencement of the glandular enlargement in this affection is usually unattended with pain. The pain and soreness seldom come on until the integuments begin to inflame, from the internal pressure of the enlarged gland. When the abscess bursts, its contents are found to be a mixture of pus and cheesy or curdy substance. These affections very commonly run on to suppuration under the common plans of treatment, and when the matter has discharged itself by the bursting of the abscess, the part is usually slow in healing. It frequently happens that no sooner one place heals up than another breaks out, and there is often a succession of swellings and sores in various stages of suppuration and healing.

The topical remedies commonly employed in these affections are leeches; lotions, generally medicated with acetate of lead or sulphate of zinc; salt and water, or sea water; and poultices after suppuration has been discovered to have commenced.

The tincture of iodine, applied over the enlarged gland, will much more frequently cause a dispersion of the swelling than any other remedy. If resorted to before suppuration has actually commenced, and used with discretion, it will, in a great majority of cases, check the swelling, and will ultimately promote the absorption of the morbid deposit. The same remarks will apply to these swellings as to common boils: even when suppuration has begun

before recourse is had to the tincture, or when it has taken place in spite of the tincture, still the application of the iodine is highly beneficial, in limiting the extent of the abscess, thereby limiting the size of the scar which is to follow. Moreover, when the swelling has burst, an occasional touch of the remedy will be found materially to accelerate the cicatrisation of the sore.

We have never had reason to think that the iodine exerts any *specific* influence over these swellings, as it undoubtedly does over that of the thyroid gland. It subdues inflammation of the lymphatic glands in the same way as it does inflammation of any other part, namely, by imparting a contractile tone to the capillary vessels, so as to restore the balance between the two functions of secretion and absorption.

WHITLOW.

A deep-seated whitlow, though originally occupying a small part of a very small member, is yet one of the most serious local affections, dependent upon acute inflammations, to which the attention of the surgeon is liable to be called.

This affection consists of inflammation of some part of the last phalanx of the fingers and thumb. It is sometimes superficial, being situated immediately under the skin. When this is the case, it soon forms a vesicle containing a serous fluid, or serum mixed with pus. After this has burst, or has been let out, it often leaves a little ulcer about the root of the nail, which proves very troublesome and difficult to heal.

When the disease originates in the deep-seated parts, such as the sheaths of the tendons, or the periosteum of the last phalanx, the pain is excessive, attended with the sensation of strong throbbing, together with increased heat; but the swelling in the finger is frequently very trifling for some days. The parts which first and most swell, are the hand, wrist, and arm; and the pain, which is very severe, extends along the member, up to the axilla. After a few days, the finger swells more, and some indistinct fluctuation may, perhaps, be felt towards the end of it, generally on the palmar side. Suppuration has now commenced, and unless the part be immediately—or even before this stage—laid freely open, the bone, especially the last phalanx, will be almost sure to die. The soft parts about the finger, hand, and wrist will swell enormously; matter will burrow in all directions under the fascia, and amongst the sheaths of the tendons; the integuments will ultimately ulcerate in various parts, and the dead fascia and cellular membrane will protrude in ropes through the openings. While this process is going on in the soft parts, the bones of the fingers are losing their vitality and becoming carious.

The local applications commonly used for this disease, are, a leech or two to the end of the inflamed finger, followed by a Goulard lotion, or a poultice, to the finger and hand: laying the part

freely open, down to the bone, and then poulticing it. This should be done without fail as soon as it is found that the inflammation does not end in resolution.

As soon as the pain and throbbing of whitlow are felt to be coming on, the whole finger or thumb (whichever it may be,) ought immediately to be painted over with the tincture of iodine, of its full strength. In about twelve hours, the application should be repeated, unless the morbid sensation has ceased, which is often the case, even after the first application. In every case, however, it will be prudent to repeat the remedy two or three times, at intervals of twenty-four hours. Except where it was certain that suppuration had actually commenced, we do not remember an instance in which the tincture has failed to subdue the disease. Whenever it is suspected that matter exists, or even when that is doubtful, if the inflammation does not give way in a few hours, a *free* incision should be made into the part: the tincture should then be applied over the finger, as well as over the hand if at all swelled; and it should be made to insinuate itself freely into the incision. After an hour or two have been allowed to elapse, a small poultice should be applied to the end of the finger—confining it to as small an extent beyond the incision as possible, its object being merely to keep the wound from healing. The same treatment should be repeated daily as long as any vestige of the disease remains.

Within the last eight months we have had two fair specimens of the destructive nature of this disease under treatment at the Infirmary. The two cases were so similar that one description will do for both—indeed, for almost every neglected case of deep seated whitlow.

In both these cases, the part originally affected was the little finger. The only difference in the two, when they presented themselves, was, that in one the palmar surface of the finger was dry and black; whereas in the other the whole finger was swelled to three or four times its natural size, and it looked a complete mass of sloughing cellular membrane and pus. The hand was enormously swollen and inflamed, with ulcerated openings here and there, through which sloughs of dead membrane and fascia were protruding. The redness and swelling extended to the other fingers, and up the wrist, as high as the middle of the arm. The pain was so great that the patients had had no sleep for many days. The whole hand and fingers presented such a mass of disease that it was impossible to determine the amount of mischief done to the bones, any further than that the three phalanges of the little finger were destroyed. Poultices and fomentations, or soaking in warm water, had been diligently used from the commencement of the disease, but incision of the part had been neglected in both cases. The hand was first washed clean of the poultice, in warm water, and left exposed to the air for a short time, in order that its surface might dry. The tincture of iodine, of full strength, was then applied thickly all over it, including the space from the middle of

the fore-arm to the tip of the fingers. After that, a thin piece of rag was thrown loosely round the part, and the hand put in a sling. The patient, in both instances, slept soundly the very first night after the application of the remedy. Next day the swelling was found much reduced, and there was only a remnant of the *pain* existing. The same treatment was repeated every day for about a week or ten days, when the inflammation was all gone, and the swelling was so reduced as to enable us readily to determine the extent of mischief done to the bones, and to render an operation easy. The finger was removed in each case, at the knuckle joint, and dressed in the usual way, only that at each dressing the wound and the whole hand were brushed over with the tincture. About three weeks after the operation each patient was discharged, cured.

CHILBLAINS.

The parts most subject to chilblains are the toes, especially the little toe. Those next most liable are the fingers, especially the little finger. The ears, nose, and cheeks, also, not unfrequently become chilled.

In this troublesome affection we find a species of inflammation without any heat or pain, for the most part. It is true that the part affected requires a temperature somewhat above the standard when it has been in a warm room, or kept near the fire, for some time; but that is very trifling, and even then the heat does not convey the same sensation as that of common inflammation of the same seat. It is also true that, under the circumstances just stated, a certain degree of pain is felt, but the sensation is more that of itching, and is quite different from that attending either phlegmonous or erysipelatous inflammation. Strictly speaking, the only elements of inflammation observable are redness and swelling. These are often present in a considerable degree of intensity—so much so, that the death of the part is by no means an uncommon result. Sometimes, however, an erysipelatous inflammation of the foot and leg proceed from the chilled part, and the case then assumes a new character.

We have already noticed that those parts are most liable to become chilled in which the velocity of the circulation is least. The vital contractility of the capillaries is reduced by the long continued application of cold, so that they become enlarged in capacity, and retain considerably more than their due proportion of blood. As the vessels continue to enlarge, the motion of the fluid becomes slower, until, at last, it ceases altogether, and the part ulcerates or sloughs.

Experience has taught people in general, that applications of a stimulating nature are the most efficacious in this complaint, some of the *professional* remedies, however, are still applied upon the antiphlogistic principle. But the most common applications are embrocations containing camphor, ammonia, oil of turpentine, and

other stimulating fluids; and, when the skin has ulcerated, ointments containing some of the gum resins form the usual dressings.

The best preventive of chilblains, with which we are acquainted, consists in immersing the parts affected every night in warm water, into which some common salt has been thrown. When the fingers are liable to chill, the hands should never, if possible, be washed in cold water during the winter months.

Scarcely a week passes in the winter that children with chilled feet are not brought for assistance—some with deep and extensive ulcerations about the heels and outside of the feet; and others with some of the toes sloughing off. The disease is usually checked in its progress by two or three applications of the tincture of iodine. The remedy should be applied, in its full strength, to the distance of some inches beyond the boundary of the inflammation, and should be repeated daily for some time. The affected parts should also be immersed every night in water as hot as the patient can bear. When the ulcers have assumed a healthy aspect, and the surrounding skin has lost its dark, livid, unhealthy colour, the strength of the tincture may be reduced, and its application repeated every two or three days only, until the ulcers have quite healed. The ulcers should be painted over with the tincture each time of its application, and then dressed with any simple ointment, or, in preference, ointment containing some resinous gum.

We stated that the chilled parts sometimes assume an erysipelatous character; and when this is the case they have a great tendency to run into gangrene.

A woman, aged about 70 years, had one of her feet much chilled throughout the winter and spring. She did not apply for surgical aid, but kept poultices and other popular remedies applied to the part affected. The weather having become suddenly hot, and she being obliged to stand a good deal upon her legs during two or three days, the foot began to inflame round the ulcer, which was situated on the outside of the little toe, and the inflammation extended rapidly up the leg. When we saw it a couple of days after, the foot and leg, nearly as high as the knee, were very much swollen and inflamed, and the skin about the instep appeared of a dark colour, and was beginning to form blisters. The tongue was of a brown colour, the pulse very quick and weak, thirst intense: in fact, the constitutional disturbance was very great. The tincture, of full strength, was immediately applied all over the foot and leg. Next day the skin of the leg was shriveled, and the limb, down to the ankle, was scarcely larger than natural. The foot, however, was still inflamed and swollen, although the pain in it—which had been before excessive—was nearly gone. The tincture was repeated, over the foot and toes. After the second application no further trouble was had with the case; the outside of the foot and sore were touched occasionally, and the latter dressed with common cerate, until it healed. The bullæ dried up, and the cuticle desquamated, leaving the surface clean and fresh.

It is remarkable in cases of this kind to find the constitutional symptoms so readily to give way as the local disease abates. Although in this case, as well as in very many analogous ones treated in a similar way, calomel and opium were administered, yet the fever and constitutional irritation abated before the mercury could have any great effect upon the system, judging from cases where the same internal remedies have been applied, and trusted to chiefly for subduing inflammation.

LACERATED, CONTUSED, AND PUNCTURED WOUNDS.

Wounds vary considerably in their nature, as well as in the degree of danger attending them. The danger depends generally much more on the part to which the violence has been done, than upon the extent or size of the wound produced by it. It not unfrequently happens that slight wounds about the head, though mere incisions, are followed by fatal erysipelas. Such effects occasionally follow the removal of tumours from the scalp: still more frequently does erysipelatous inflammation take place consequent on lacerations of that part.

Again, wounds, whether lacerated or punctured, of tendinous parts often lead to great and fatal constitutional disturbance, though very slight with regard to both depth and extent. Locked-jaw and tetanus frequently follow very trifling punctures, even when the wound itself has healed, or is apparently healing favourably. The belief has generally been that wounds followed by these effects are accompanied by a partial division of a nerve or tendon: this, however, is mere surmise, for the constitutional derangement sometimes follows where no reason exists for suspecting any such injury.

But the most common constitutional effect arising from external violence, is *fever*—that is, an acceleration of the action of the heart, accompanied with heat of skin, thirst, coated tongue, and general restlessness. These symptoms are almost always preceded by a good deal of local inflammation in the seat of injury, and the general fever is considered as “*symptomatic*” of the local disease, or as “*sympathetic*” with it, and is called so accordingly.

We have already noticed the readiness with which the general symptoms often abate as the local disease is subdued by topical remedies, and have intimated that the former are, in most instances, entirely dependent upon the local affection. We are well aware that, in broaching such an opinion, we lay ourselves open to severe criticism, as well as to misconstruction, but one must not shut his eyes against facts; nor for fear of being misunderstood or misconstrued, ought he to remain silent respecting those facts, when they relate so intimately to the treatment of disease.

Now, that local disease is frequently associated with, and occasionally dependent on, general derangement of health, no one will dispute. The history of hereditary diseases, such as scrofula, gout, &c. proves that fact. It often occurs that, previous to the appear-

ance of erysipelatous inflammation of the head, legs, or other part, the patient has for some days suffered restlessness and uneasiness, indicating the general health to be wrong; but the appearance of the erysipelas does not mitigate the constitutional symptoms: on the contrary, the fever generally runs much higher on the breaking out of the local disease, and as the latter becomes abated, the former also will abate with it. The instances on the other hand, of local disturbance giving rise to constitutional disturbance, are much more striking. A person, in perfect health, receiving such local injury as to cause inflammation of a certain degree and extent, is almost sure to suffer general derangement; and if the local affection be removed by topical remedies, the general fever will also give way without any aid from internal remedies.

A part of the body becomes "spontaneously" inflamed in a person who does not complain of any general disorder—who, in fact, has been long feeling in good health: as the inflammation extends, the general health becomes deranged, and a high degree of symptomatic fever is set up. Had there been any previous general derangement, there must have been some symptoms to indicate it. The fact appears to be, that, in such cases, there exists in the system some morbid agent, which has no pernicious relation with the vital structure in general, but which will deleteriously associate itself with some special seat, in its passage through it in the course of circulation. The functions of that seat are then disturbed, in consequence of the local derangement, and the system becomes secondarily affected, as it does in cases where external violence has been inflicted upon any local part. In such instances, which, in our opinion, are the most common, the symptomatic fever will give way as the inflammation abates under local treatment, though no general remedial measures be used.

The degree of pain in a wound of the lacerated, contused, or punctured kind, is often no criterion of the amount of danger attending it; for sometimes a whole limb is torn from the body, and yet the pain, as felt and described by the patient, is not severe. In cases of this kind the impression upon the system is so great that the sensibility of the nerves appears to be annihilated, and death occasionally takes place before they recover their powers: at any rate, the death is not owing either to hemorrhage or to inflammation consequent on the injury, but to the general shock impressed upon the system by the magnitude of the violence.

The usual method of treating lacerated wounds, is to bring the edges gently together, or to approximate them as near as can be done without using violence, and then to retain them in that position by means of sticking plaster. Sutures are occasionally used, when the laceration is very extensive; but sutures should be avoided as much as possible, because they serve to add to the disturbance already caused by the solution of continuity of the living tissues, and may produce gangrene of the edges of the wound. Having adapted the torn parts, and secured them in their position, most

practioners employ an evaporating lotion, especially that of Goulard. This remedy applies equally to lacerations and contusions. Others prefer poultices to lotions. In fact, the principle has been that of preventing inflammation as much as possible, by those remedies which come under the general term "antiphlogistics ; and the object has been commonly aimed at by means of lotions in lacerations and contusions, and of poultices in punctures.

In infirmary practice, wounds of this nature, of various extent and severity, are constantly presenting themselves, and since the treatment by iodine has been adopted, little trouble, comparatively, has been had with them at the institution in this town. When the accident is one of simple laceration, as soon as the wound is well cleansed of any dirt or blood that may be adhering to it, and the bleeding guarded against, every point of its surface is touched with the tincture, generally of its full strength, and the application is extended some inches beyond its edges. Having allowed it a few minutes to dry, the edges are brought together, and there retained with sticking plaster ; which completes the dressing. On the third or fourth day, according to circumstances, the plaster is removed, when, generally, the parts that had been brought into contact will be found united, and the rest of the wound will be beginning to granulate and presenting a healthy appearance. The remaining surface of the wound, and the surrounding skin, are again brushed over with the tincture, and the former dressed with common wax ointment. The same practice is repeated every day, or every other day, according to circumstances, until the wound has healed. The cure is generally—nay, almost in every instance—most rapid.

When the accident is contusion simply, the tincture is applied over the contused surface every day or two, and the part is then left without any further dressing. The extravasated blood will be absorbed in a fourth of the time that it will take to disappear under the use of a lead lotion ; and we have never witnessed an instance where an unfavourable issue resulted.

When there exists a combination of laceration and contusion, the treatment is also a compound, although simple enough. The surface of the wound is brushed over with the tincture, and the same application is made to the contused skin, however extensive. The wound is then brought into approximation, and there retained by means of either a roller or sticking plaster. The remedy is re-applied according to the necessity of the case.

With regard to punctured wounds, those which have come of late years under our notice have been upon a small scale ; but we conceive that all wounds of this description require the same principle of treatment. Whether a piece of iron be in the shape of a bayonet or that of a nail, will not matter much ; if driven into the flesh, or into any other tissue of the body, either will inflict a punctured wound, attended by similar symptoms, and followed by similar consequences.

In several instances of the minor kinds of punctured wounds

the tincture of iodine has been used with that kind of almost un-deviating success which it exerts over local diseases and injuries attended by inflammation. If applied liberally, immediately after the receipt of the injury, generally no inflammatory symptoms take place. If the application be commenced after inflammation has been set up by the violence of the injury, the effect will be the same as that attending its use in common phlegmon. Unless suppuration has already begun, the malady will end in resolution after one or two applications; and if suppuration has actually commenced, or if there be a disposition to sloughing, the mischief will be confined, under the influence of the remedy, to a small compass.

In these cases, our practice has been to let the tincture insinuate itself freely into the wound, and to apply it thickly to the skin surrounding the wound: then to allow the part to remain exposed. In trivial cases, such as the prick of a pin or needle, it is seldom that any further notice is taken of the accident after the first application. The injuries from nails, or other pointed pieces of iron, from the pricks of thorns, &c., sometimes cause very severe inflammation and constitutional disturbance; but we have found them invariably give way to the treatment just described.

BURNS AND SCALDS.

In cases of extensive burns, life often ceases to exist before the immediate effect of the shock on the system is thrown off. The injury is inflicted upon a wide-spread and important tissue, upon which an equally important class of nerves is distributed; and the danger is generally dependent more upon the extent of the violence than upon its intensity.

Three classes of remedies are used as topical applications in burns and scalds: first, cold lotions, medicated with acetate of lead or other materials; ice; the scrapings of potatoes, and, in fact, every thing calculated to cool the injured part: the second consists in the application of oil of turpentine, or of spirit of wine, as soon as possible after the receipt of the injury; and then to dress the part with cerates containing some of the same stimulants: the third class comes between the other two in point of medicinal quality; for it consists neither in the abstraction of heat from the part nor in stimulating it to a reaction, but in soothing it with linseed oil, or some other oily matter. These different remedies have been descanted upon so frequently by surgical writers, that it would be a waste of time for the reader to be drawn over the same ground again. We may state, however, in passing, that the treatment with oil of turpentine, or spirit of wine, or any other spirituous liquor in the absence of these, is, according to the experience we have had in such cases, very superior to either of the other two plans.

Fortunately, since the tincture of iodine has been tried in burns and scalds, we have not met with a *very severe* accident of that

description, but in four or five cases where the injury was upon a moderate scale, the remedy proved so successful as to leave scarcely a comparison between it and those commonly employed. It seems to act on burns and scalds as it does on erysipelas. When the integuments are not destroyed, although the cuticle may be in blisters, one or two applications of the tincture, of moderate strength, will subdue the pain and redness, and the case will require no further attention than to prevent the injured part from rubbing against the clothes or other things; or if on the legs or feet, to use rest until the skin has had time to recover its tone and cuticle. The remedy has been used in instances where the injury has been occasioned by fire, by boiling water, and by boiling lard, with equal success in all of them; but further trial must determine its effects in cases where the violence has been very extensively applied.

ULCERS.

Ulcers present such a variety of character as almost to defy classification; and if such an attempt were made, it would occupy a volume much larger than the present to treat of that subject alone. However, it is probable that all the varieties might be brought under two principal heads: first, ulcers dependent upon the *sloughing* of parts: second, ulcers dependent upon the *absorption* of parts. These are divisible into specific and non-specific; and each may be again sub-divided according to its external characters, or its effects on the living tissues.

Most of the specific ulcers depend on the absorption of parts: thus, we have chancre, lupus, cancer, &c. Among the non-specific, some are caused by sloughing, some by absorption, and some partly by both processes. Again, specific ulcers are almost uniform, according to their kind, in their external characters; whereas the non-specific present an endless variety in that respect. Hence, we have the clean granulating or healthy ulcer; the irritable without sloughing, with the jagged edges; the sloughing; the hospital or phagedenic; the varicose; ulcers connected with exfoliation of the bones; those caused by pressure, such as lying long in one posture, and many others, differing too minutely in their nature to come within the limit of general description.

The treatment of ulcers has been as various as ulcers themselves. Among the usual remedies, we have lotions; poultices, of bread, linseed, carrots; poultices containing beer grounds, charcoal, &c.; ointments of ever so many descriptions; fomentations: tinctures of myrrh, benzoin, &c.; nitrate of silver; sulphate of copper; diluted acids; powdered charcoal; opium; hemlock; chalk; plaster of Paris; strapping with sticking plaster; bandages; filling the ulcers with wax, and a hundred other means.

With regard to specific ulcers, they generally require (as stated in a former part of this work,) specific remedies. We have already spoken of lupus as giving way to the application of the tincture of

iodine. We have also used it in several cases of chancre, and have found the ulcer to heal much quicker than under the usual mercurial application, or the nitrate of silver. The tincture has been likewise used in ulcers of a carcinomatous character; and although we should not be justified in speaking of it in positive terms as being capable of curing cancer—certainly not cancer of the mamma—yet so many cases distinguished by scirrhus indurations, accompanied by malignant ulcerations, especially of the lips, tongue, and tonsils, have given way under its use, that, certainly, no topical remedy at present in the possession of surgery seems to equal it in efficacy in affections of that description.

It is quite evident that the first step towards the cure of a non-specific ulcer, is to render its surface clean, granulating, and healthy. The rest consists in promoting the growth of the healthy granulations. Towards accomplishing these two objects, the long list of local remedies already specified, and of a great many more, has been frequently searched, and its contents applied, in vain.

Now, when an ulcer is unhealthy; when it has a slough on its surface; or when the parts beyond its edges show a tendency to die; or when the discharge from its surface is sanious and acrid; or when its edges are jagged; or when its surface looks bloody, and the granulations, if there be any, are soft and spongy; or when it rapidly spreads, from progressive absorption—in all such cases, it is pretty clear that the vessels of the part are not in their natural and healthy condition.

The question then is, what agent is there within our knowledge, whose medicinal virtues are capable of restoring the vessels to their normal state? The question has already been answered more than once: the tincture of iodine possesses that virtue in a much higher degree than any topical remedy within our means. As we said before, we do not know *why* it should be endued with such a property—*why* it should be capable of curing so many local affections, differing so materially in their outward characters; but the *fact* is that it *is* capable of doing so, as any one may prove by putting the remedy to the trial. But, if we refer to the view taken of the nature of local disease, there seems to be nothing very *wonderful* in such a fact: the wonder would be if it were otherwise.

In all cases of sloughing, or irritable, or spreading ulcers, the tincture, of full strength, is applied freely over their surface, and to the skin, to the extent of two or three inches round them. Having been allowed to remain for some time, the ulcer is covered over with simple ointment of lint, or with a poultice, the former being generally preferred. The same application is repeated daily until the ulcer becomes clean and healthy. The tincture is then weakened, and the granulations are touched with it every two or three days. Under this plan the cavity of the ulcer fills up rapidly with healthy granulations. Where the ulcer is in a situation to have pressure applied, either a bandage or strapping with sticking plaster

is had recourse to as soon as the surface has become clean and has put on a healthy appearance.

Among several other local affections in which the tincture of iodine has been used with good effect, but whose treatment it is not necessary to follow out in detail, are gouty and rheumatic swellings of the small joints, from thickening of their ligaments; fistulous openings; malignant warts or adventitious excrescences; ganglions; the stinging of wasps; disease of the spine; ununited fractures; hernia humoralis; inflamed urethra, and chordee; inflammation of the bursæ; chronic ophthalmia, and opacities of the cornea, much diluted; dissection wounds, or scratches exposed to the dead body in dissection, &c. The strength of the remedy in the several cases must depend upon the judgment of the practitioner.

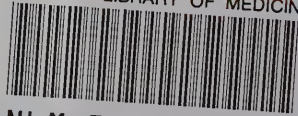
It may not be amiss, in conclusion, to repeat the caution given at the commencement of this treatise, against the indiscreet employment of the tincture. If applied to a part too frequently, or too strong, it may cause the skin to inflame, and the cuticle to blister, but that is the only inconvenience which has ever occurred from its use.

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